```
=> file hcaplus
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FILE COVERS 1907 - 9 Aug 2005  VOL 143 ISS 7
FILE LAST UPDATED: 8 Aug 2005  (20050808/ED)
```

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This file contains CAS Registry Numbers for easy and accurate substance identification.

```
=> d que l59
L38           3 SEA FILE=REGISTRY ABB=ON  (7440-37-1/BI OR 9002-84-0/BI OR
                9003-01-4/BI)
L40           1 SEA FILE=REGISTRY ABB=ON  L38 AND TETRAFLUO?
L41           4 SEA FILE=REGISTRY ABB=ON  TITANIA/CN OR SILICA/CN OR ZIRCONIA/C
                N OR ALUMINA/CN
L43       52837 SEA FILE=REGISTRY ABB=ON  PI/PCT
L44       71965 SEA FILE=HCAPLUS ABB=ON  (PORE# OR POROUS? OR POROS?)(5A)(SUBST
                RATE? OR BASE# OR GLASS? OR CERAMIC? OR L41 OR TIO2 OR SIO2 OR
                AL2O3 OR ZRO2 OR ZIRCONIA OR TITANIA OR SILICA OR ALUMINA)
L45        5882 SEA FILE=HCAPLUS ABB=ON  (PORE# OR POROUS? OR POROS?)(5A)(ONORG
                ? OR L40 OR TTFE OR TETRAFLUOROETHYLENE OR (TITANIUM OR
                ALUMINUM OR SILICON OR ZIRCONIUM)(W)?OXIDE? OR POLYIMID?)
L46        5062 SEA FILE=HCAPLUS ABB=ON  (PORE# OR POROUS? OR POROS?)(5A)(INORG
                ? OR L43 OR HEAT?(2A)RESIST?(2A)?POLYMER?)
L47        6932 SEA FILE=HCAPLUS ABB=ON  (L44 OR L45 OR L46) AND MEMBRANE
L48         329 SEA FILE=HCAPLUS ABB=ON  (L44 OR L45 OR L46) AND MEMBRANE(4A)EL
                ECTROLYT?
L49           4 SEA FILE=HCAPLUS ABB=ON  L48 AND FILL?(4A)(?ACRYL? OR GRAFT?(3A
                )(MONOMER? OR POLYMER?))
L50          23 SEA FILE=HCAPLUS ABB=ON  L47 AND FILL?(4A)(?ACRYL? OR GRAFT?(3A
                )(MONOMER? OR POLYMER?))
L51          96 SEA FILE=HCAPLUS ABB=ON  L47 AND PROTON?(3A)CONDUCT?
L52          70 SEA FILE=HCAPLUS ABB=ON  L51 AND ELECTROLYT?
L53          59 SEA FILE=HCAPLUS ABB=ON  L52 AND FUEL(2A)CELL#
L54          26 SEA FILE=HCAPLUS ABB=ON  L51 AND FILL?(3A)(PORE# OR POROUS? OR
                POROS?)
L55          21 SEA FILE=HCAPLUS ABB=ON  L53 AND L54
L56         296 SEA FILE=HCAPLUS ABB=ON  L47 AND (?SWELL? OR PERMEAT? OR
                REACT?)(3A)(WATER? OR H2O OR AQUESOUS? OR METHANOL OR MEOH OR
                ORG?(W)SOLVENT#)
L57          14 SEA FILE=HCAPLUS ABB=ON  L56 AND FILL?(3A)(PORE# OR POROUS? OR
                POROS?)
L58          49 SEA FILE=HCAPLUS ABB=ON  L49 OR L50 OR L55 OR L57
L59          26 SEA FILE=HCAPLUS ABB=ON  L58 AND (ELECTROCHEM?/SC,SX,AB,BI OR
```

```
                  FUEL(2A)CELL#)


=> file wpix
FILE 'WPIX' ENTERED AT 17:04:59 ON 09 AUG 2005
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FILE LAST UPDATED:              5 AUG 2005      <20050805/UP>
MOST RECENT DERWENT UPDATE:        200550          <200550/DW>
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

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    PLEASE CHECK:
http://thomsonderwent.com/support/dwpiref/reftools/classification/code-revision/
    FOR DETAILS. <<<

=> d que l69
L61         34794 SEA FILE=WPIX ABB=ON  (PORE# OR POROUS? OR POROS?)(5A)(SUBSTRAT
                  E? OR BASE# OR GLASS? OR CERAMIC? OR TIO2 OR SIO2 OR AL2O3 OR
                  ZRO2 OR ZIRCONIA OR TITANIA OR SILICA OR ALUMINA)
L62          7323 SEA FILE=WPIX ABB=ON  (PORE# OR POROUS? OR POROS?)(5A)(INORG?
                  OR TTFE OR TETRAFLUOROETHYLENE OR (TITANIUM OR ALUMINUM OR
                  SILICON OR ZIRCONIUM)(W)?OXIDE? OR POLYIMID?)
L63          5739 SEA FILE=WPIX ABB=ON  (PORE# OR POROUS? OR POROS?)(5A)(INORG?
                  OR HEAT?(2A)RESIST?(2A)?POLYMER?)
L64         39871 SEA FILE=WPIX ABB=ON  (L61 OR L62 OR L63)
L65          7680 SEA FILE=WPIX ABB=ON  (PORE# OR POROUS? OR POROS?)(3A)FILL?
L66          1813 SEA FILE=WPIX ABB=ON  L64 AND L65
L67           116 SEA FILE=WPIX ABB=ON  L66 AND MEMBRANE?
L69            18 SEA FILE=WPIX ABB=ON  L67 AND H01M008?/IC


=> dup rem l59 l69
FILE 'HCAPLUS' ENTERED AT 17:05:18 ON 09 AUG 2005
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PROCESSING COMPLETED FOR L59
PROCESSING COMPLETED FOR L69
L70            42 DUP REM L59 L69 (2 DUPLICATES REMOVED)
```

=> d l70 all hitstr 1-42

L70 ANSWER 1 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2005:695897 HCAPLUS
ED Entered STN: 05 Aug 2005
TI High polymer **electrolyte membrane**, the production method, **membrane** for **fuel cell** - electrode zygote and **fuel cell** [Machine Translation].
IN Oya, Nobuo; Harada, Hiroshi; Yamaguchi, Takehisa
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01B001-06; H01B013-00; H01M008-10
CC 52 (**Electrochemical**, Radiational, and Thermal Energy Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2005209361	A2	20050804	JP 2004-11529	20040120
PRAI	JP 2004-11529		20040120		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2005209361	ICM	H01M008-02
	ICS	H01B001-06; H01B013-00; H01M008-10
JP 2005209361	FTERM	5G301/CA30; 5G301/CD01; 5G301/CE01; 5H026/AA06; 5H026/AA08; 5H026/BB00; 5H026/BB03; 5H026/CX04; 5H026/EE18; 5H026/HH05; 5H026/HH06; 5H026/HH08

AB [Machine Translation of Descriptors]. The high polymer **electrolyte membrane** whose swelling is little due to water and the methano - etc., the production method, the **membrane** for **fuel cell** which shows satisfactory **fuel cell** quality - the electrode zygote and **fuel cell** are offered. The **electrolytic** polymer - the polymer - filling up with state inside the **pore** of the **polyimide porous membrane**, it becomes, doing decompression operation when 60 , **proton conductivity** with of relative humidity 95% the 4.010⁻²the high polymer **electrolyte membrane** which is below 1.0S/cm above S/cm, the **electrolytic** polymer which possesses **proton conduction** function - has soaked the **polyimide porous membrane** in the liquid, soaks the **electrolytic** polymer - production method of the aforementioned high polymer **electrolyte membrane** which it **fills** up inside the **pore** of the **polyimide porous membrane**, the **membrane** for **fuel cell** which uses the said high polymer **electrolyte membrane** - the electrode zygote, solid high mol. weight form **fuel cell** and directly the methano - shape **fuel cell** . It is not.

L70 ANSWER 2 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2005-081985 [09] WPIX
DNN N2005-071950 DNC C2005-028573
TI Production of integrated **membrane** electrodes containing ion-exchange resin-**filled** polymer **substrate** and **porous** electroconducting sheets, for use in electrochemical devices, fuel cells and electrolytic cells.

```
DC   L03 X16
IN   WAN, N; WANG, G
PA   (LISA-I) LI S; (XUGA-I) XU G
CYC  105
PI   WO 2005004274   A1 20050113 (200509)* ZH   30    H01M008-10    <--
        RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS
            LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
         W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK
            DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR
            KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH
            PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC
            VN YU ZA ZM ZW
     AU 2003304303   A1 20050121 (200522)              H01M008-10    <--
ADT  WO 2005004274 A1 WO 2003-CN527 20030703; AU 2003304303 A1 AU 2003-304303
     20030703, WO 2003-CN527 20030703
FDT  AU 2003304303 A1 Based on WO 2005004274
PRAI WO 2003-CN527          20030703
IC   ICM  H01M008-10
     ICS  H01M002-14; H01M008-02
```

AB WO2005004274 A UPAB: 20050207

NOVELTY - An integrated **membrane** electrochemical devices comprises at least a polymer **substrate** which has high **porosity** or microporous structure as supporting framework inside the **membrane**, in which 2 porous electrically- conductive sheets for supporting the **membrane** and conducting current to an external circuit are provided on each side of the polymer substrate.

DETAILED DESCRIPTION - An integrated **membrane** electrochemical devices comprises at least a polymer **substrate** which has high **porosity** or microporous structure as supporting framework inside the **membrane**, in which 2 porous electrically-conductive sheets for supporting the **membrane** and conducting current to an external circuit are provided on each side of the polymer substrate, an ion-exchange resin is injected into such polymer substrate and all micropores of whom are completely filled with the resin so as to form a dense **membrane**, the **membrane** is gas-impermeable and contacts tightly with the porous electroconducting sheets disposed on both of its sides, such **membrane** and the two sheets are bounded together to form an integrative assembly, and at least a first catalyst layer is installed on outside of each porous electroconducting sheet. INDEPENDENT CLAIMS are also included for:

(1) a similar electrode in which all surfaces of the porous electroconducting sheets are provided with a second catalyst layer; and

(2) a method for producing the integrated **membrane** electrodes by injecting an ion-exchange resin into the polymer substrate before assembling the electroconducting sheets with the first, or optionally second, catalyst layers formed into an integrated unit.

USE - The produced **membrane** electrodes are for use in electrochemical devices e.g. for electrochemical synthesis, fuel cells and electrolytic cells.

ADVANTAGE - Such electrodes, which have high mechanical strength and stable dimension, have simple structure and can be assembled easily for convenient use, at low cost.

Dwg.0/12

```
FS   CPI EPI
FA   AB
MC   CPI: L03-E04A2; L03-E04B
     EPI: X16-C01C; X16-E06A5C

L70  ANSWER 3 OF 42  WPIX  COPYRIGHT 2005 THE THOMSON CORP on STN
AN   2005-490569 [50]   WPIX
```

DNN N2005-399691 DNC C2005-149776
TI Polyelectrolyte composite film for polymer electrolyte fuel cell, is obtained by **filling** gaps of **porous base** material with sulfonic acid group content polyarylene having specific repeating unit.
DC A23 A26 A85 L03 X12 X16
IN ASANO, Y; HIUE, M; KANAOKA, N; NANAUMI, M; OTSUKI, T; SOMA, H
PA (HOND) HONDA MOTOR CO LTD; (JAPS) JSR CORP
CYC 1
PI JP 2005166557 A 20050623 (200550)* 31 H01M008-02 <--
ADT JP 2005166557 A JP 2003-406364 20031204
PRAI JP 2003-406364 20031204
IC ICM **H01M008-02**
ICS C08J009-40; H01B001-06; H01B013-00; **H01M008-10**
AB JP2005166557 A UPAB: 20050805

NOVELTY - A polyelectrolyte composite film (3) is obtained by **filling** gaps of a **porous base** material with a sulfonic acid group content polyarylene having specific repeating unit.

DETAILED DESCRIPTION - A polyelectrolyte composite film is obtained by **filling** gaps of a **porous base** material with a sulfonic acid group content polyarylene having repeating unit of formula (A).

A = bivalent electron attractive group;
B = bivalent electron donor group or bivalent direct bond;
Ar = aromatic group having -SO3H substituent;
m,n = 0-10; and
k = 1-4.

INDEPENDENT CLAIMS are also included for the following:

(1) manufacture of polyelectrolyte composite film, which involves drying **porous base** material impregnated with solution of polyarylene having sulfonic acid group; and

(2) polymer electrolyte fuel cell which has a **membrane** electrode structure with a polymeric electrolyte film, which is clamped by pair of electrode catalyst layer.

USE - For polymer electrolyte fuel cell (claimed) for mobile telephone and mobile personal computer.

ADVANTAGE - The polyelectrolyte composite film has low electrical resistance and high mechanical strength. Gas leakage by destruction of **membrane** or electrode during formation of **membrane** electrode assembly is prevented.

DESCRIPTION OF DRAWING(S) - The figure shows the sectional drawing of electrode structure used for the polymer electrolyte fuel cell.
Oxygen pole 1
Fuel electrode 2
Polyelectrolyte composite film 3
Diffused layer 4
Electrode catalyst layer 5
Dwg.1/1
FS CPI EPI
FA AB; GI
MC CPI: A05-J; A11-B; A12-E06; L03-E04A2
EPI: X12-D01C; X12-D01E; X16-C01C; X16-J01A; X16-J08

L70 ANSWER 4 OF 42 WPIX
AN 2005-245667 [26] WPIX
DNN N2005-202296 DNC C2005-078572
TI Composite ion-exchange **membrane** for polymer electrolyte fuel cell, has surface layer having fluorine group ion-exchange resin, and composite layer and another surface layer each having non-fluorine group ion-exchange resin.

DC A85 J01 L03 X12 X16 X21
PA (TOYM) TOYOBO KK
CYC 1
PI JP 2005044611 A 20050217 (200526)* 34 H01M008-02 <--
ADT JP 2005044611 A JP 2003-202574 20030728
PRAI JP 2003-202574 20030728
IC ICM **H01M008-02**
ICS B01D053-22; B01D069-10; B01D069-12; B01J039-20; B01J047-12; H01B001-06; **H01M008-10**
AB JP2005044611 A UPAB: 20050422
NOVELTY - Composite ion-exchange **membrane** has a surface layers (1,3) formed on both surfaces of composite layer (2). The composite layer is obtained by **filling** a **porous base** material with an ion-exchange resin. At least one surface layer (1) and composite layer contain a non-fluorine group ion-exchange resin, and the other surface layer (3) contains a fluorine group ion-exchange resin.

DETAILED DESCRIPTION - The non-fluorine group ion-exchange resin is polyarylene ether copolymer. The **porous base** material is **porous membrane** containing polybenzazole group polymer, fluorine resin, polyimide resin, amide resin and polyolefin resin. An INDEPENDENT CLAIM is included for polymer electrolyte fuel cell.

USE - As solid-polymer electrolyte film used for polymer electrolyte fuel cell (claimed) used as power supply device for electric vehicle.

ADVANTAGE - The composite ion-exchange **membrane** has excellent mechanical strength and ionic conductivity. The polymer electrolyte fuel cell efficiently generates electric power in low humidification and high temperature environment.

DESCRIPTION OF DRAWING(S) - The figure shows the sectional view of composite ion-exchange **membrane.**

surface layer containing non-fluorine group ion-exchange resin 1
composite layer 2
surface layer containing fluorine group ion-exchange resin 3

Dwg.1/1
FS CPI EPI
FA AB; GI
MC CPI: A12-E06B; A12-M05; J01-E03E; J01-H02B; L03-E04A2
EPI: X12-D01C; X12-D01E; X16-C01C; X16-J01A; X21-A01F; X21-B01A

L70 ANSWER 5 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 1
AN 2004:874132 HCAPLUS
DN 141:368336
ED Entered STN: 21 Oct 2004
TI Small-sized **fuel cell** and **electrolyte membrane**
IN Yamaguchi, Takehisa; Harada, Hiroshi; Oya, Nobuo; Yao, Shigeru; Hashiguchi, Shuichi
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 16 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01M008-10; H01M008-24
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004296278	A2	20041021	JP 2003-87270	20030327
PRAI	JP 2003-87270		20030327		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2004296278	ICM	H01M008-02
	ICS	H01M008-10; H01M008-24
JP 2004296278	FTERM	5H026/AA06; 5H026/BB00; 5H026/BB01; 5H026/BB02; 5H026/BB08; 5H026/BB10; 5H026/CX05; 5H026/EE02; 5H026/EE18; 5H026/EE19; 5H026/HH08

AB The **fuel cell** has a H+ conducting **electrolyte membrane**, having a H+ **electrolyte filled** in a **porous membrane**, serving as a **substrate** plate, unit cells containing a pair of electrodes on opposite sides of the substrate, conductive passes penetrating the substrate connecting the unite cells in series, and insulation layer in the **electrolyte membrane** between neighboring unit cells. The **electrolyte membrane** has H+ conductive **electrolyte filled** in a **porous membrane**, conductive passes penetrating the **membrane**, insulator **fillers filled** in the **pores** not **filled** with the **electrolyte**; and is hot pressed, when the **membrane** is a thermoplastic, or hot pressed in a precursor state when the **membrane** is a polyamide, to form the insulation layer.

ST **fuel cell** polymer **electrolyte membrane** structure

IT **Fuel cells**
(polymer **electrolyte**; structure of **proton conductive electrolyte** membranes containing penetrating elec. passes in insulated ares for **fuel cells**)

L70 ANSWER 6 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:717902 HCAPLUS
DN 141:228115
ED Entered STN: 02 Sep 2004
TI Manufacture of polymer **electrolyte membrane** and polymer **electrolyte fuel cell** using the **membrane**
IN Ito, Nobuaki; Kitai, Masayuki
PA Toray Industries, Inc., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01B013-00; H01M008-10
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004247123	A2	20040902	JP 2003-34701	20030213
PRAI	JP 2003-34701		20030213		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2004247123	ICM	H01M008-02
	ICS	H01B013-00; H01M008-10
JP 2004247123	FTERM	5H026/AA08; 5H026/BB00; 5H026/BB03; 5H026/CX01; 5H026/CX05; 5H026/EE18; 5H026/HH00; 5H026/HH04; 5H026/HH05

AB The **electrolyte membrane**, having H+ conductors

filled in a **porous substrate** having through
holes, is prepared by irradiating a substrate, having absorption ≥60%
in wavelength range 330-500 nm, with a laser beam to form the through
holes. The substrate is preferably a polyimide or an aromatic polyamide.

ST **fuel cell proton conducting electrolyte** manuf **porous polyimide substrate**; arom polyamide **porous substrate fuel cell electrolyte**

IT Polyimides, uses
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(aromatic; manufacture of **electrolyte** membranes containing **proton conductors** in **porous** polymer **substrates** for **fuel cells**)

IT **Fuel cell electrolytes**
Laser radiation
(manufacture of **electrolyte** membranes containing **proton conductors** in **porous** polymer **substrates** for **fuel cells**)

IT 24968-11-4, Polyethylene naphthalate 25230-87-9 27028-97-3D, Polyphenylene sulfide sulfone, sulfonated 149984-45-2, Mictron
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(manufacture of **electrolyte** membranes containing **proton conductors** in **porous** polymer **substrates** for **fuel cells**)

L70 ANSWER 7 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:530382 HCAPLUS
DN 141:91785
ED Entered STN: 02 Jul 2004
TI **Electrolyte membrane**
IN Furukawa, Mikio; Toma, Katsuyuki; Yamada, Yoshinao; Ito, Akira
PA Unitika Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01B001-06; H01M008-10
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004185973	A2	20040702	JP 2002-351237	20021203
PRAI	JP 2002-351237		20021203		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2004185973	ICM	H01M008-02
	ICS	H01B001-06; H01M008-10
JP 2004185973	FTERM	5G301/CA30; 5G301/CD01; 5H026/AA06; 5H026/CX03; 5H026/EE18; 5H026/HH00; 5H026/HH01; 5H026/HH08

AB The **membrane**, especially for a **fuel cell** has a polyimide nonwoven fabric substrate and a **proton-conductive** resin **filled** in **pores** of the **substrate**.

ST **fuel cell electrolyte membrane**
proton conductive resin filled polyimide
IT **Fuel cell electrolytes**
(**electrolyte** membranes containing **proton-conductive** resin filled polyimide nonwoven fabrics for **fuel cells**)
IT Polyimides, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**electrolyte** membranes containing **proton-conductive** resin filled polyimide nonwoven fabrics for **fuel cells**)
IT Polyoxyalkylenes, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; **electrolyte** membranes containing **proton-conductive** resin filled polyimide nonwoven fabrics for **fuel cells**)
IT Fluoropolymers, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; **electrolyte** membranes containing **proton-conductive** resin filled polyimide nonwoven fabrics for **fuel cells**)
IT Ionomers
RL: TEM (Technical or engineered material use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; **electrolyte** membranes containing **proton-conductive** resin filled polyimide nonwoven fabrics for **fuel cells**)

L70 ANSWER 8 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:412213 HCAPLUS
DN 140:409645
ED Entered STN: 21 May 2004
TI **Electrolyte** membranes with good durability and low methanol permeability for **fuel cells**
IN Hiraoka, Hideki; Yamaguchi, Takehisa
PA Toa Gosei Chemical Industry Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01B001-06; H01M008-10
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004146279	A2	20040520	JP 2002-311929	20021025
PRAI	JP 2002-311929		20021025		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2004146279	ICM	H01M008-02
	ICS	H01B001-06; H01M008-10
JP 2004146279	FTERM	5G301/CA30; 5G301/CD01; 5H026/AA08; 5H026/BB03; 5H026/BB10; 5H026/CX05; 5H026/EE18

AB The **electrolyte** membranes, useful for direct methanol **fuel cells**, showing rate of increase in area after immersion in water at 25° for 1 h ≤20%, comprise **porous substrates filled** with **proton**

-**conducting** crosslinked polymers prepared from protonic
acid-containing monomers or their salts and crosslinking agents satisfying
ratios of mol number of the monomers to number of mol number of the crosslinking
agents multiplied by average functional number per a crosslinking agent
50:(2-50).

ST direct methanol **fuel cell** polymer **electrolyte**
membrane; acrylamidemethylpropanesulfonic acid
methylenebisacrylamide polymer porous polyethylene **electrolyte**

IT **Polyimides**, uses
Polyolefins
RL: DEV (Device component use); USES (Uses)
(crosslinked, **porous electrolyte substrate**
; **electrolyte** membranes with good durability and low methanol
permeability for **fuel cells**)

IT **Fuel cell electrolytes**
Fuel cells
Polymer **electrolytes**
(**electrolyte** membranes with good durability and low methanol
permeability for **fuel cells**)

IT Ionic **conductors**
(**protonic**; **electrolyte** membranes with good
durability and low methanol permeability for **fuel**
cells)

IT 69824-22-2P, 2-Acrylamido-2-methylpropanesulfonic acid-N,N'-
methylenebisacrylamide copolymer 689231-96-7P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP
(Preparation); USES (Uses)
(**electrolyte** membranes with good durability and low methanol
permeability for **fuel cells**)

IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(**porous electrolyte substrate**;
electrolyte membranes with good durability and low methanol
permeability for **fuel cells**)

L70 ANSWER 9 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:312130 HCAPLUS
DN 140:306825
ED Entered STN: 16 Apr 2004
TI Direct methanol **fuel cells**, their **fuel**
electrodes, and their manufacture
IN Yoshikawa, Hiroshi
PA Noritake Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 16 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M004-86
ICS H01M004-88; H01M008-10
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy
Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004119072	A2	20040415	JP 2002-277902	20020924
PRAI	JP 2002-277902		20020924		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2004119072	ICM	H01M004-86

ICS H01M004-88; H01M008-10
JP 2004119072 FTERM 5H018/AA06; 5H018/AA07; 5H018/BB01; 5H018/BB03; 5H018/BB08; 5H018/CC06; 5H018/DD06; 5H018/DD08; 5H018/EE03; 5H018/EE05; 5H018/EE10; 5H018/EE12; 5H018/EE16; 5H018/EE17; 5H018/HH01; 5H018/HH03; 5H018/HH04; 5H018/HH05; 5H018/HH08; 5H026/AA06; 5H026/AA08; 5H026/BB04; 5H026/CX05; 5H026/EE05; 5H026/EE18; 5H026/HH01; 5H026/HH03; 5H026/HH04; 5H026/HH05; 5H026/HH08

AB The fuel electrode comprises a porous conductive support covered with a porous layer. The coating is formed by application of a liquid composition containing carbon particles of average size 200-400 nm and thermosetting resins, followed by hardening of the composition at ≤300°. **Fuel cell** comprising the said fuel electrode and an **electrolyte membrane** consisting of a **porous inorg. substrate filled** with **proton-conductive** polymer is also claimed.

ST direct methanol **fuel cell** electrode porous carbon; **proton conductive** polymer **electrolyte fuel cell**

IT Carbon black, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(N 990; manufacture of direct methanol **fuel cell fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

IT **Fuel cells**
(direct methanol; manufacture of direct methanol **fuel cell fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

IT Hybrid organic-inorganic materials
(**fuel cell electrolytes**; manufacture of direct methanol **fuel cells** with **fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

IT **Fuel cell electrolytes**
(hybrid organic-inorg. materials; manufacture of direct methanol **fuel cells** with **fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

IT **Fuel cell** electrodes
(manufacture of direct methanol **fuel cell fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

IT Ionic **conductors**
(**protonic, fuel cell electrolytes** containing; manufacture of direct methanol **fuel cells** with **fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

IT Phenolic resins, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(resol; manufacture of direct methanol **fuel cell fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

IT Plastics, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(thermosetting; manufacture of direct methanol **fuel cell fuel** electrodes by heat treatment of porous conductive support

coated with thermosetting resins containing carbon particles)
IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(MCMB 10G, Toka Black 7050, and Toka Black 7550SB; manufacture of direct methanol **fuel cell fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)
IT 127005-23-6, Sumilit PR 50781
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)
(manufacture of direct methanol **fuel cell fuel** electrodes by heat treatment of porous conductive support coated with thermosetting resins containing carbon particles)

L70 ANSWER 10 OF 42 WPIX
AN 2004-652885 [63] WPIX
DNN N2004-516628 DNC C2004-233587
TI New metal acid phosphate composition, useful in electrochemical devices e.g. fuel cells, comprises solid acid triphosphate of tetravalent metal.
DC A85 E32 L03 V01 X16
IN ALBERTI, G; MASCI, S; VIVANI, R
PA (FUMA-N) FUMA TECH GES FUNKTIONELLE MEMBRANEN
CYC 108
PI WO 2004074179 A1 20040902 (200463)* EN 46 C01B025-37
RW: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
ADT WO 2004074179 A1 WO 2004-EP1514 20040218
PRAI IT 2003-PG5 20030219
IC ICM C01B025-37
ICS B01D071-02; B01J027-16; H01G009-00; **H01M008-00**
AB WO2004074179 A UPAB: 20041001
NOVELTY - A metal acid phosphate composition comprising a solid acid triphosphate of a tetravalent metal, is new.

DETAILED DESCRIPTION - A metal acid phosphate composition comprises a solid acid triphosphate(s) of formula MIV (HPO4)(H2PO4)2 (A).

M = tetravalent metal.

INDEPENDENT CLAIMS are included for the following:

(a) preparation of the composition involving:

(i) treating a metal MIV containing material (a) in phosphoric acid (at least 85%, especially anhydrous phosphoric acid);

(ii) incubating the material at 70-100 deg. C; and

(iii) separating the material containing (A) and phosphoric acid;

(b) a composite **membrane** (M) made up of organic polymers and at least one (A);

(c) protonic separator **membrane** containing at least one metal acid triphosphate;

(d) thin layer containing at least one preferably crystallized tetravalent metal acid triphosphate;

(e) catalyst powder containing at least one tetravalent metal acid triphosphate;

(f) a super capacitor having two conductors separated by a dielectric comprising at least one (A);

(g) a fuel cell containing at least two electrodes (preferably porous electrodes) and a proton conducting thin layer or **membrane**

comprising at least one (A); and

(h) a protonic pump with an anode, a cathode and a proton conductive separator comprising at least one (A).

USE - In the preparation of a composite **membrane**, protonic conduction separator **membrane**, thin layer, catalyst powder, super capacitor, fuel cell, protonic pump, (claimed) and electrochemical sensor. The fuel cells are useful in electric cars, cameras, computers and cellular phones and include direct methanol fuel cells (DMFc), hydrogen fuel cells and reformate fuel cells. The protonic pumps are useful for e.g. electrochemical hydrogenation and dehydrogenation of organic compounds, for hydrogen production from hydrogenated organic compounds by electro-refining, and for removing hydrogen from equilibrium reactions. The thin layers include **inorganic** (preferably **ceramic**) and polymeric **porous membranes.** The catalysts include heterogeneous catalyst for non-aqueous, aqueous anhydrous gaseous and anhydrous gas phase reactions e.g. for acid catalysis in organic solvents, electro-catalysis in electrochemical sensors and in hydrogenation and esterification reactions.

ADVANTAGE - The composition has a low permeability to organic solvents, such as methanol, is insoluble in water; the greater part of most organic solvents, and is proton conductible in a non-proton conductible polymer in a state free from water i.e. a relative humidity of lower than 1% and up to 100 deg. C. The composition shows a high protonic conductivity of (at least 0.001, preferably greater than 0.01 especially 0.01-0.04) S/cm in surroundings substantially free from water, i.e. in non-water assisted environments. In spite of containing hafnium as the tetravalent metal, the composition is stable in air up to at least 100 deg. C and at a water vapor partial pressure of less than 7 mm Hg. The composition is insoluble in water at less than 8 deg. C, and is stable in common organic solvents such as alcohol, carbon tetrachloride, dimethylformamide and benzene at less than 110 deg. C, and is completely impermeable to methanol. The compounds are also inexpensive to produce for application in mass products. The electrochemical sensors are useful in anhydrous gaseous environments and in organic liquids.
Dwg.0/13

FS CPI EPI
FA AB; DCN
MC CPI: A12-E06B; E31-K03; E31-K04; E31-K05B; L03-E04A1; N03-B; N04-B
 EPI: V01-B01; X16-C01A

L70 ANSWER 11 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2004-450050 [42] WPIX
DNN N2004-356191 DNC C2004-168661
TI Alcohol-air fuel cell useful for production of generators comprises anode chamber with liquid active anode, air chamber with active gas-diffusion cathode, and electrolyte chamber with liquid and a **membrane** electrolyte.
DC A26 A85 L03 X16
IN KARICHEV, Z R; TARASEVICH, M R
PA (INDE-R) INDEPENDENT POWER TECHNOLOGIES IPT STOCK; (IPTI-R) IPT INDEPENDENT POWER TECHN STOCK CO; (INDE-R) INDEPENDENT POWER TECHNOLOGIES STOCK CO
CYC 107
PI WO 2004047204 A1 20040603 (200442)* EN 12 H01M008-00 <--
 RW: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE
 LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
 W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK
 DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
 KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG
 PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ

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          VC VN YU ZA ZM ZW
     RU 2230400       C1 20040610 (200446)              H01M008-04     <--
     AU 2003287114   A1 20040615 (200470)               H01M008-00     <--
ADT  WO 2004047204 A1 WO 2003-RU500 20031118; RU 2230400 C1 RU 2002-130656
     20021118; AU 2003287114 A1 AU 2003-287114 20031118
FDT  AU 2003287114 A1 Based on WO 2004047204
PRAI RU 2002-130656          20021118
IC   ICM  H01M008-00; H01M008-04
     ICS  H01M008-10
AB   WO2004047204 A UPAB: 20040702
     NOVELTY - An alcohol-air fuel cell comprises anode chamber with liquid
     catalytically active anode, air chamber with catalytically active
     gas-diffusion cathode (preferably non-platinum catalyst, tolerant in
     respect to alcohol), and electrolyte chamber with liquid electrolyte
     (preferably aqueous alkaline solution) and membrane electrolyte,
     which is positioned between the cathode and the anode..
          USE - For the production of generators on the base of the alcohol-air
     fuel cells (AAFCs).
          ADVANTAGE - The AAFCs has high efficacy and is inexpensive. The use
     of alkaline electrolyte makes it possible to use a more concentrated
     alcohol-water mixture which enhances the electrical characteristics of the
     AAFC, makes the selection of structural materials easier and makes it
     possible to use catalysts of base metals, which reduces the cost of the
     AAFC. The use of non-platinum catalyst, tolerant in respect to alcohol,
     makes it possible to prevent contamination of the cathode catalyst with
     diffusing alcohol and associated with reduction of the electrical
     characteristics of AAFC. The use membrane electrolyte limits the
     diffusion of the alcohol from the anode to the cathode and prevents a
     reduction of the characteristics of the AAFC because it self-discharge.
     Dwg.0/1
FS   CPI EPI
FA   AB
MC   CPI: A12-E06; L03-E04
     EPI: X16-C03; X16-E06A

L70  ANSWER 12 OF 42  WPIX  COPYRIGHT 2005 THE THOMSON CORP on STN
AN   2004-569949 [55]   WPIX
DNN  N2004-450727
TI   Ion exchange membrane used as diaphragm for direct methanol type
     fuel cell, has porous film with ion exchange resin filled
     pores and surface layer having inorganic filler and ion
     exchange resin.
DC   X16 X21 X27
IN   FUKUTA, K; MATSUOKA, H
PA   (TOKU) TOKUYAMA CORP; (FUKU-I) FUKUTA K; (MATS-I) MATSUOKA H
CYC  4
PI   US 2004137297   A1 20040715 (200455)*      12     H01M008-10     <--
     DE 10361035     A1 20040729 (200455)              B01J047-12
     JP 2004217921   A  20040805 (200455)       17     C08J005-22
     KR 2004058063   A  20040703 (200472)              H01M008-02     <--
ADT  US 2004137297 A1 US 2003-743146 20031223; DE 10361035 A1 DE 2003-10361035
     20031223; JP 2004217921 A JP 2003-432339 20031226; KR 2004058063 A KR
     2003-96484 20031224
PRAI JP 2002-377454          20021226
IC   ICM  B01J047-12; C08J005-22; H01M008-02; H01M008-10
     ICS  H01M008-02
AB   US2004137297 A UPAB: 20040826
     NOVELTY - The ion exchange membrane has porous film having pores
     with average diameter of 0.01-2 mu m and a surface layer. The pores of the
     film are filled with ion exchange resin. The surface layer has inorganic
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filler having particle diameter of 0.1 or more times the average pore diameter and below 50 mu m and ion exchanger resin.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) ion exchange **membrane** production method;

(2) diaphragm; and

(3) direct methanol type fuel.

USE - Used as diaphragm (claimed) for direct methanol type fuel cell (claimed) used in automobiles, domestic electrical appliances, portable devices, redox flow cell and zinc-bromine cells and as diaphragm for dialysis and for use in sensors.

ADVANTAGE - The ion exchange **membrane** has low methanol permeability, low **membrane** resistance, and provide high output stably. Provides high performance ion exchange **membrane** efficiently.

DESCRIPTION OF DRAWING(S) - DESCRIPTION OF DRAWING - The figure shows a schematic view of the direct methanol type fuel cell.

cell structure 1
fuel flow hole 2
oxidizing gas hole 3
diffusion electrodes 4,5
solid polymer electrolyte 6
Dwg.1/2

FS EPI
FA AB; GI
MC EPI: X16-C01C; X16-J01A; X16-J08; X21-A01F; X21-B01A; X27-X

L70 ANSWER 13 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2005-068525 [08] WPIX
DNN N2005-059092 DNC C2005-024126
TI Polymeric electrolyte film for fuel cell, secondary battery, has **porous base** material of preset **glass** transition point, filled with phenol resin having sulfonic acid group or its salt.
DC A28 A85 L03 V01 X12 X16
PA (UBEI) UBE IND LTD
CYC 1
PI JP 2004363028 A 20041224 (200508)* 11 H01B001-06
ADT JP 2004363028 A JP 2003-162092 20030606
PRAI JP 2003-162092 20030606
IC ICM H01B001-06
ICS C08J009-36; H01B013-00; **H01M008-02**
AB JP2004363028 A UPAB: 20050202

NOVELTY - The polymeric electrolyte film has **porous base** material which has **glass** transition temperature above 100 deg. C, filled with phenol resin having sulfonic acid group or its salt.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for manufacture of polymeric electrolyte film. A solution obtained by mixing phenol and/or its derivative(s), sulfite and/or hydrogen sulfite, formaldehyde aqueous solution containing formaldehyde compound and/or methylol and paraformaldehyde, and water, was packed in a **porous base** material and cured.

USE - As ion exchange **membrane** and separation **membrane** for fuel cell, secondary battery and capacitors.

ADVANTAGE - A polymeric electrolyte film with excellent heat resistance, is manufactured with sufficient reproducibility. The polyelectrolyte is **filled** efficiently in the **porous base** material.

Dwg.0/0
FS CPI EPI

FA AB; GI
MC CPI: A05-C03; A12-E06B; L03-E04A2
EPI: V01-B01B1; X12-D01C; X16-B01F; X16-C01C; X16-F02; X16-J01A; X16-J08

L70 ANSWER 14 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2004-638166 [62] WPIX
DNN N2004-504250 DNC C2004-229678
TI Electrolyte film for fuel cells, is formed by filling perfluorocarbon polymerized electrolyte in pore of porous **membrane** having solvent insoluble property.
DC A26 A85 L03 X16
PA (UBEI) UBE IND LTD
CYC 1
PI JP 2004247182 A 20040902 (200462)* 13 H01M008-02 <--
ADT JP 2004247182 A JP 2003-35967 20030214
PRAI JP 2003-35967 20030214
IC ICM **H01M008-02**
ICS H01B001-06; **H01M008-10**
AB JP2004247182 A UPAB: 20040928
NOVELTY - The electrolyte film is formed by filling a perfluorocarbon polymerized electrolyte in pore of a porous **membrane** having solvent insoluble property.
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:
(1) manufacture of electrolyte film;
(2) electrolyte-film-electrode joint component; and
(3) fuel cell.
USE - For electrolyte-film-electrode joint component and fuel cells (both claimed).
ADVANTAGE - The electrolyte film provides highly efficient fuel cell. The electrolyte film has favorable reproducibility and dimensional stability.
Dwg.0/0
FS CPI EPI
FA AB
MC CPI: A12-E06A; A12-E09; L03-E04A2; L03-E04B
EPI: X16-C01C; X16-E06A

L70 ANSWER 15 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2004-510380 [49] WPIX
DNN N2004-403611 DNC C2004-189246
TI Manufacture of hybrid material such as electrolyte film, comprises immersing specific **membrane** into specific solution, reducing pressure, irradiating, contacting **porous base** with **membrane** and removing excess functional substance.
DC A14 A17 A26 A32 A85 L03 X16
PA (TOAG) TOA GOSEI CHEM IND LTD; (UBEI) UBE IND LTD
CYC 1
PI JP 2004171994 A 20040617 (200449)* 19 H01M008-02 <--
ADT JP 2004171994 A JP 2002-337980 20021121
PRAI JP 2002-337980 20021121
IC ICM **H01M008-02**
ICS H01B013-00; **H01M008-10**
AB JP2004171994 A UPAB: 20040802
NOVELTY - The porous **membrane** (PM) is hydrophilized. A specific substance is added to functional substance (FS) or its solution, and hydrophilized PM is immersed into FS solution. The pressure of system comprising PM immersed into solution, is reduced. The system is irradiated, and FS is **filled** into **pore** of PM. A **porous base** material, is contacted with PM, and FS

adhered excessively to PM, is removed to manufacture hybrid material.
DETAILED DESCRIPTION - The porous **membrane** is hydrophilized. A surface active substance is added to functional substance or its solution, and the hydrophilized porous **membrane** is immersed into the solution of functional substance. The pressure of system consisting of porous **membrane** immersed into the solution, is reduced. The system is irradiated with ultrasonic wave, and the functional substance is **filled** into **pore** of the **porous membrane.** A **porous base** material which absorbs functional substance, is made to contact with both surfaces of the porous **membrane.** The functional substance which adhered excessively to both surfaces of the porous **membrane**, is removed with a smooth material to manufacture hybrid material.
USE - For manufacturing hybrid material such as electrolyte film for fuel cell such as polymer electrolyte fuel cell and direct methanol-type fuel cell.
ADVANTAGE - The hybrid material consisting of **porous membrane filled** uniformly with functional substance, is manufactured effectively and simply. The hybrid material is homogenous, and has improved reproducibility, dimensional stability and proton conductivity and suppressed crossover (permeation) of methanol.
Dwg.0/0

FS CPI EPI
FA AB
MC CPI: A11-B05D; A11-C04B2; A12-E06B; L03-E04; L03-E04A2; L03-E05D
EPI: X16-C01C; X16-J01A

L70 ANSWER 16 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2004-181614 [18] WPIX
DNN N2004-144354 DNC C2004-071962
TI Composite separator plate for use in fuel cell array, e.g. bipolar plate for proton exchange **membrane** fuel cell used as energy source e.g. in vehicle, contains expanded graphite or compressible conductive material dispersed in polymer.
DC A32 A85 L03 X16
IN ABD ELHAMID, M H; BLUNK, R H; LISI, D J; MIKHAIL, Y M
PA (GENK) GENERAL MOTORS CORP; (ELHA-I) ABD ELHAMID M H; (BLUN-I) BLUNK R H; (LISI-I) LISI D J; (MIKH-I) MIKHAIL Y M
CYC 3

PI	DE 10330832	A1	20040205	(200418)*	20	H01M008-02	<--
	US 2004062974	A1	20040401	(200425)		H01M008-02	<--
	JP 2004134373	A	20040430	(200430)	18	H01M008-02	<--

ADT DE 10330832 A1 DE 2003-10330832 20030708; US 2004062974 A1 Provisional US 2002-394647P 20020709, US 2003-603684 20030626; JP 2004134373 A JP 2003-272199 20030709
PRAI US 2002-394647P 20020709; US 2003-603684 20030626
IC ICM **H01M008-02**
ICS B29C043-02; B29C070-58; C08K003-00; C08K003-04; C08L101-00; H01B001-24
AB DE 10330832 A UPAB: 20040316
NOVELTY - Composite separator plate for use in a fuel cell array, of the type with a first surface and a second surface turned away from the first, comprises expanded graphite (IA) dispersed in a polymer material (II).
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:
(1) composite separator plate of this type, comprising compressible conductive material (IB) dispersed in (II);
(2) production of the separator plate by preparing (IA) particles, dispersing them in (II) and press molding.
USE - The composite separator plate is used in fuel cells (claimed)

and is e.g. a bipolar plate for proton exchange **membrane** (PEM) fuel cells used as energy source for many purposes, including vehicle applications.

ADVANTAGE - Existing composite separator plates with a high content of graphite powder in a polymer matrix withstand the corrosive environment of fuel cells but are inherently brittle and dense. Plates containing aligned conductive fibers can be made thinner. Reducing the carbon content makes them less brittle but makes it very difficult to attain the required electrical and thermal conductivity. These drawbacks are avoided in the present plates. They have high electrical and thermal conductivity at low contents of conductive filler, can be molded to thin and less brittle plates and meet the mass and volume requirements for fuel cells.

DESCRIPTION OF DRAWING(S) - The drawing shows a schematic exploded view of a proton exchange **membrane** (PEM) fuel cell.

Fuel cell array with bipolar PEM and 2 cells 10
Membrane electrode arrays 12, 14
Electrically conductive, liquid-cooled, bipolar separator plate 16
Stainless steel clamping plates 18, 20
Current collector end plates 22, 24
Insulating seals 36, 38, 40, 42
Gas-permeable carbon/graphite diffusion media 44, 46, 48, 50

Dwg.1/12

FS CPI EPI
FA AB; GI
MC CPI: A12-E06B; L03-E04G
EPI: X16-C16

L70 ANSWER 17 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2004-432715 [41] WPIX
DNN N2004-342013 DNC C2004-162203
TI Flexible **membrane** for fuel cells, e.g. for cars or domestic systems, comprises a **porous** composite support **filled** with polymer electrolyte, a **porous substrate** of **glass** or polymer fibres, and a **porous ceramic** coating.
DC A18 A23 A26 A85 L03 X16
IN HENNIGE, V; HOERPEL, G; HYING, C
PA (CREA-N) CREAVIS GES TECHNOLOGIE & INNOVATION MBH
CYC 1
PI DE 10254732 A1 20040603 (200441)* 20 H01M008-02 <--
ADT DE 10254732 A1 DE 2002-10254732 20021123
PRAI DE 2002-10254732 20021123
IC ICM **H01M008-02**
AB DE 10254732 A UPAB: 20040629

NOVELTY - Fuel cell **membrane** which is impermeable to the reaction components comprises a flexible, permeable composite support in which the **pores** are 75% **filled** with a proton-conducting polymer electrolyte, a flexible **porous** two-dimensional **substrate** made of woven and/or non-woven **glass** or polymer fibres, and a **porous ceramic** coating.

DETAILED DESCRIPTION - Dimensionally-stable, proton-conducting, flexible **membrane** (FM) for fuel cells which is impermeable to the reaction components in fuel cell reactions, comprising a flexible, permeable composite support, a flexible substrate with a large number of openings and a coating in this substrate. The substrate material consists of woven and/or non-woven glass or polymer fibres, the coating is a **porous ceramic** coating and the **pores** in the support are filled to at least 75% with a proton-conducting polymer electrolyte. INDEPENDENT CLAIMS are also included for

(a) a method (M1) for the production of FM by infiltrating electrolyte(s) or polymer electrolyte(s) or precursors thereof into the pores of the support as above

(b) a flexible **membrane**-electrode unit (MEU) for fuel cells, with conductive anode and cathode layers on either side of FM

(c) a method (M2) for the production of MEU by making FM as above, preparing a material for the production of electrode layers (proton-conductive component, catalyst (or precursor) for the anode or cathode reaction, optionally a catalyst support and optionally a pore-former), coating this material onto each side of the **membrane** (FM) and producing a strong bond between the coatings and the **membrane**, with the formation of a porous, proton-conducting anode or cathode layer

(d) fuel cells containing FM or MEU

(e) mobile or stationary systems with an MEU, fuel cell or fuel cell stack containing FM or MEU as above.

USE - In fuel cells, direct-methanol fuel cells and reformate fuel cells, or for the production of **membrane**-electrode units, fuel cells or fuel cell stacks (claimed); also claimed is the use of **membrane**-electrode units containing these electrolyte **membranes** in the applications listed above. Applications include mobile and stationary fuel cells for cars and domestic energy systems.

ADVANTAGE - A dimensionally-stable, proton-conducting, flexible **membrane** which shows almost no change in volume after swelling or drying (in spite of the necessary swelling), combined with good conductivity and good long-term stability (especially because of the reduced risk of washing out the electrolyte). This system combines the advantages of polymer electrolytes (water-resistance, long-term stability, high conductivity) with those of flexible **ceramic** **membranes** (dimensional stability, high **porosity**, flexibility).

Dwg.0/0

FS CPI EPI
FA AB
MC CPI: A12-E06B; L03-E04G
EPI: X16-C01C; X16-F02

L70 ANSWER 18 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:667347 HCAPLUS
DN 141:228026
ED Entered STN: 16 Aug 2004
TI Nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temperatures
AU Bocchetta, P.; Chiavarotti, G.; Masi, R.; Sunseri, C.; Di Quarto, F.
CS Dipartimento di Ingegneria Chimica dei Processi e dei Materiali, Universita di Palermo, Palermo, 90128, Italy
SO Electrochemistry Communications (2004), 6(9), 923-928
CODEN: ECCMF9; ISSN: 1388-2481
PB Elsevier B.V.
DT Journal
LA English
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49, 57
AB Thin film **fuel cells** have been fabricated by impregnation of **inorg. porous** membranes with **inorg. proton conductor.** Anodic alumina membranes (50 μm thick and 200 nm **pore** diameter), **filled** with CsHSO4 have been used as **protonic conductor** in a hydrogen-oxygen **fuel cell** working between 423 and 443

K in dry atmospheric Polarization curves at 433 K showing ohmic control with open circuit values near 0.8 V and short circuit current around 8 mA cm-2 have been obtained. Possible causes of degradation as well as alternative routes to overcome some of the problems encountered with this approach will be reported.

ST alumina **membrane** solid acid filler thin film **fuel cell**

IT Short circuits
(current; nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT Membranes, nonbiological
(**inorg.**, **porous**; nanoporous **alumina** membranes **filled** with solid acid for thin film **fuel cells** at intermediate temps.)

IT Ionic conductors
(inorg.; nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT **Fuel cell electrolytes**
(**membrane**; nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT Differential thermal analysis
Electric current-potential relationship
Open circuit potential
Polarization
Pore structure
Porosity
Thermogravimetric analysis
X-ray diffraction
(nanoporous **alumina** membranes **filled** with solid acid for thin film **fuel cells** at intermediate temps.)

IT Carbon black, uses
Silicone rubber, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT Acids, uses
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(solid; nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT **Fuel cells**
(thin-film; nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT 7440-06-4, Platinum, uses
RL: CAT (Catalyst use); USES (Uses)
(nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT 7783-06-4, Hydrogen sulfide, uses 12038-20-9, Platinum sulfide (PtS) 12038-21-0, Platinum disulfide
RL: CAT (Catalyst use); OCU (Occurrence, unclassified); OCCU (Occurrence); USES (Uses)
(nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT 1333-74-0, Hydrogen (H2), uses 7782-44-7, Oxygen, uses
RL: CPS (Chemical process); NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(nanoporous alumina membranes filled with solid acid for thin film

fuel cells at intermediate temps.)

IT 1344-28-1, Alumina, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT 7789-16-4, Cesium bisulfate
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)
(nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(paper; nanoporous alumina membranes filled with solid acid for thin film **fuel cells** at intermediate temps.)

RE.CNT 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
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(2) Bocchetta, P; Electrochimica Acta 2003, V48, P3175 HCAPLUS
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L70 ANSWER 19 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:913296 HCAPLUS
DN 142:159313
ED Entered STN: 01 Nov 2004
TI Performance of a Pore-Filling **Electrolyte Membrane** in Hydrogen-Oxygen PEFC
AU Nishimura, Hironobu; Yamaguchi, Takeo
CS Department of Chemical System Engineering, The University of Tokyo, Bunkyo-ku, Tokyo, 113-8656, Japan
SO Electrochemical and Solid-State Letters (2004), 7(11), A385-A388
CODEN: ESLEF6; ISSN: 1099-0062
PB Electrochemical Society
DT Journal
LA English
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

AB While operating in a H2-O2 polymer **electrolyte fuel cell** (PEFC), a **membrane** electrode assembly containing a pore-filling **electrolyte membrane** composed of a **porous** cross-linked polyethylene (CLPE) **substrate** **filled** with poly(**acrylamide** tert-Bu sulfonic acid) (PATBS) showed excellent performance at ambient pressure and an operating temperature of 60°. The conductance during operation was also determined The CLPE-PATBS **membrane** showed a relatively high open-circuit

voltage of .apprx.1.0 V, despite the thinness of the **membrane**, indicating that the **membrane** suppresses H2 fuel crossover.

ST polymer **electrolyte membrane** hydrogen oxygen **fuel cell**

IT **Fuel cells**
(polymer **electrolyte**; pore-filled **electrolyte membrane** for hydrogen-oxygen fueled polymer electrolyte **fuel cells**)

IT **Fuel cell electrolytes**
Fuel cell separators
(pore-filled **electrolyte membrane** for hydrogen-oxygen fueled polymer electrolyte **fuel cells**)

IT 9002-88-4D, Polyethylene, cross-linked
RL: DEV (Device component use); USES (Uses)
(**membrane**; pore-filled **electrolyte membrane** for hydrogen-oxygen fueled polymer electrolyte **fuel cells**)

IT 830337-16-1
RL: DEV (Device component use); USES (Uses)
(pore filler; pore-filled **electrolyte membrane** for hydrogen-oxygen fueled polymer electrolyte **fuel cells**)

RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
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(22) Yamaguchi, T; Macromolecules 1991, V24, P5522 HCAPLUS
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(24) Zawodzinski, T; Solid State Ionics 1993, V60, P199 HCAPLUS

L70 ANSWER 20 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:758596 HCAPLUS
DN 142:412325
ED Entered STN: 17 Sep 2004
TI Design and development of the **pore-filling** membranes for solvent separation or polymer **electrolyte** membranes of **fuel cells**
AU Yamaguchi, Takeo
CS Department of Chemical System Engineering, University of Tokyo, Bunkyo-ku, Tokyo, 113-8656, Japan

SO Maku (2004), 29(4), 221-226
CODEN: MAKUD9; ISSN: 0385-1036
PB Nippon Maku Gakkai
DT Journal; General Review
LA Japanese
CC 38-0 (Plastics Fabrication and Uses)
AB A review on **membrane**, called the **pore-filling** **membrane.** The **membrane** is composed of two kinds of polymer materials. One is a **porous substrate** film or hollow fiber which is inert to organic liqs., and the other is a polymer, soluble with only specific solvents, **filling** the **substrate** **pores.** The solubility difference of the filling polymer exhibits permselectivity, and the substrate matrix restrains the swelling of the filling polymer. The **membrane** showed high separation performances based on the concept, and moreover the **membrane** performances can be predicted by model simulation. Thus, **membrane** design can be realized with high performances. Also, the **pore-filling** **membrane** can be used for membranes of polymer **electrolyte** **fuel cells. Proton conductivity** was achieved through the filling **electrolyte** polymer inside the porous matrix. Fuel crossover was restricted by suppression of the swelling of the **electrolyte** polymer, and the mech. strength at high temperature was maintained by the substrate. The **membrane** showed high **fuel cell** performances for both PEMFC and DMFC.
ST review **membrane pore filling** solvents sepn;
polyelectrolyte **membrane fuel cell** review
IT **Fuel cells**
Membranes, nonbiological
Polyelectrolytes
(design and development of **pore-filling** membranes for solvent separation or polyelectrolyte membranes of **fuel** **cells**)
IT Membranes, nonbiological
(hollow-fiber; design and development of **pore-filling** membranes for solvent separation or polyelectrolyte membranes of **fuel cells**)
IT Solvents
(separation; design and development of **pore-filling** membranes for solvent separation or polyelectrolyte membranes of **fuel cells**)

L70 ANSWER 21 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2004:445419 HCAPLUS
DN 141:40648
ED Entered STN: 02 Jun 2004
TI A new **proton-conducting** porous silicon **membrane** for small **fuel cells**
AU Pichonat, T.; Gauthier-Manuel, B.; Hauden, D.
CS IMFC FRW 0067, Laboratoire de Physique et Metrologie des Oscillateurs du C. N.R.S., Associe a l'Universite de Franche-Comte, Besancon, 25044, Fr.
SO Chemical Engineering Journal (Amsterdam, Netherlands) (2004), 101(1-3), 107-111
CODEN: CMEJAJ; ISSN: 1385-8947
PB Elsevier Science B.V.
DT Journal
LA English
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
AB The fabrication of a miniature **fuel cell** for portable applications, **based** on a Nafion-**filled porous**

Si **membrane**, is discussed. This technique combines the advantage of Nafion, good p conduction, with that of Si, easy serial and parallel integration. Integration of the gas feed and elec. contacts in the **membrane** etching process was enabled by the simple KOH wet etching processes and metal sputtering with the possibility of encapsulation. With this technique, lateral H2O diffusion through the **membrane**, a problem with Nafion membranes, may be decreased. All results were obtained at room temperature and H2 feed gas was obtained through the electrolysis of a NaOH solution

ST porous silicon **membrane** Nafion **electrolyte** **fuel cell**

IT **Fuel cell electrolytes**
(Nafion-**filled proton-conducting** **porous** silicon **membrane** for miniature **fuel** **cells**)

IT **Fuel cell** separators
Fuel cells
(**proton-conducting** porous silicon **membrane** for miniature **fuel cells**)

IT 66796-30-3, Nafion-117
RL: DEV (Device component use); USES (Uses)
(Nafion-**filled proton-conducting** **porous** silicon **membrane** for miniature **fuel** **cells**)

IT 7440-21-3, Silicon, uses
RL: DEV (Device component use); USES (Uses)
(**proton-conducting** porous silicon **membrane** for miniature **fuel cells**)

RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
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(2) Dimitrova, P; Solid State Ionics 2002, V150, P115 HCAPLUS
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(6) Ren, X; J Electrochem Soc 2000, V147(1), P92 HCAPLUS
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L70 ANSWER 22 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2003:778149 HCAPLUS
DN 139:294652
ED Entered STN: 03 Oct 2003
TI **Electrolyte** film and solid polymer **fuel cell** using the same
IN Yamaguchi, Takeo; Ohya, Shyusei; Nakao, Shinichi; Harada, Hiroshi
PA Japan Science and Technology Corporation, Japan; Ube Industries. Ltd.
SO PCT Int. Appl., 59 pp.
CODEN: PIXXD2
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01M008-10; H01B001-06
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 37
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003081706	A1	20031002	WO 2003-JP2630	20030306

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,

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            CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
            GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS,
            LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL,
            PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA,
            UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
        RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,
            KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,
            FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR,
            BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
     JP 2003263998         A2     20030919    JP 2002-61917          20020307
     JP 2004253147         A2     20040909    JP 2003-35968          20030214
     US 2005118479         A1     20050602    US 2003-506717         20030306
PRAI JP 2002-61917         A      20020307
     JP 2002-372154        A      20021224
     JP 2003-35968         A      20030214
     WO 2003-JP2630        W      20030306
CLASS
 PATENT NO.      CLASS  PATENT FAMILY CLASSIFICATION CODES
 -------------   -----  ----------------------------------------------
 WO 2003081706   ICM    H01M008-02
                 ICS    H01M008-10; H01B001-06
 JP 2004253147   FTERM  5H026/AA06; 5H026/BB00; 5H026/BB01; 5H026/BB03;
                        5H026/BB10; 5H026/CX05; 5H026/EE17; 5H026/EE18;
                        5H026/HH00; 5H026/HH02; 5H026/HH05; 5H026/HH06
 US 2005118479   NCL    429/033.000; 521/027.000
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AB An **electrolyte** film having a **porous base** material having **pores filled** with a first polymer capable of **conducting** a **proton**, wherein the **porous base** material comprises at least one second polymer selected from the group consisting of polyimides and polyamides, and a **fuel cell**, particularly a solid polymer **fuel cell**, more specifically a direct methanol polymer **fuel cell**, using the **electrolyte** film are disclosed. The **electrolyte** film is excellent in the inhibition of **permeation** of **methanol**, exhibits very little change in its surface area, and is excellent in **proton conductivity**

ST polymer **electrolyte membrane** direct methanol **fuel cell**

IT Polymer **electrolytes**
   (composite; for direct methanol **fuel cells**)

IT **Fuel cells**
   (direct methanol; polymer **electrolyte** membranes for)

IT Polyimides, uses
   RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
   (hydride **electrolyte membrane** for direct methanol **fuel cells** from)

IT Polyamic acids
   RL: SPN (Synthetic preparation); PREP (Preparation)
   (hydride **electrolyte membrane** for direct methanol **fuel cells** from)

IT 26615-45-2P 30735-05-8P, Acrylic acid-sodium vinylsulfonate copolymer 69824-22-2P, 2-Acrylamido-2-methylpropane sulfonic acid-methylene-bis-acrylamide copolymer
   RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
   (hydride **electrolyte membrane** for direct methanol **fuel cells** from)

IT 26298-81-7P, 3,3',4,4'-Biphenyltetracarboxylic acid dianhydride-4,4'-diaminodiphenyl ether copolymer 56091-26-0P

RL: SPN (Synthetic preparation); PREP (Preparation)
(hydride **electrolyte membrane** for direct methanol **fuel cells** from)

RE.CNT 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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(4) Honda Motor Co Ltd; EP 1085590 A1 2001 HCAPLUS
(5) Honda Motor Co Ltd; JP 2001158806 A 2001 HCAPLUS
(6) Honda Motor Co Ltd; JP 200181220 A 2001
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(13) Uni-Chemical Co Ltd; WO 0233709 A1 2003 HCAPLUS
(14) Uni-Chemical Co Ltd; JP 200386021 A 2003
(15) Yamaguchi, T; JP 200283612 A 2002

L70 ANSWER 23 OF 42 HCAPLUS

AN 2003:42219 HCAPLUS
DN 138:94139
ED Entered STN: 17 Jan 2003
TI Preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochemical** cells
IN Chartier, Thierry; Guillotin, Francois
PA Air Liquide SA pour l'Etude et l'Exploitation des Procedes Georges Claude, Fr.
SO PCT Int. Appl., 51 pp.
CODEN: PIXXD2
DT Patent
LA French
IC ICM C04B038-06
ICS B22F003-11
CC 57-2 (Ceramics)
Section cross-reference(s): **52**
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003004439	A1	20030116	WO 2002-FR1659	20020516
	W: JP, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	FR 2826956	A1	20030110	FR 2001-8895	20010704
	FR 2826956	B1	20040528		
	JP 2004533400	T2	20041104	JP 2003-510409	20020516
	EP 1487760	A1	20041222	EP 2002-738254	20020516
	R: DE, FR, GB, IT				
	US 2004183055	A1	20040923	US 2003-482559	20031230
PRAI	FR 2001-8895	A	20010704		
	WO 2002-FR1659	W	20020516		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003004439	ICM	C04B038-06
	ICS	B22F003-11

WO 2003004439	ECLA	B01D039/20D; B01D039/20H; B22F003/11D6; B22F003/22; B22F003/26; C04B038/06D; H01M008/12E
FR 2826956	ECLA	B01D039/20D; B01D039/20H; B22F003/11D6; B22F003/22; B22F003/26; C04B038/06D; H01M008/12E
JP 2004533400	FTERM	4D006/GA41; 4D006/MA03; 4D006/MA06; 4D006/MA25; 4D006/MA30; 4D006/MB04; 4D006/MC02X; 4D006/MC03X; 4D006/NA39; 4D006/NA45; 4D006/NA50; 4D006/PA01; 4D006/PB17; 4D006/PB62; 4D006/PB63; 4D006/PC69; 4D006/PC80; 4G019/GA02; 4G019/GA04; 4G069/AA08; 4G069/CC17; 4G069/DA06; 4G069/EA08; 4G069/EC29; 4G069/FA01; 4G069/FA03; 4G069/FB15; 4G069/FB31; 4G069/FB33; 5H026/AA06; 5H026/BB00; 5H026/BB01; 5H026/BB02; 5H026/BB03; 5H026/BB06; 5H026/BB08; 5H026/CX05; 5H026/EE02; 5H026/EE12; 5H026/EE13; 5H026/EE14; 5H026/HH03; 5H026/HH05
US 2004183055	NCL	252/500.000
	ECLA	B01D039/20D; B01D039/20H; B22F003/11D6; B22F003/22; B22F003/26; C04B038/06D; H01M008/12E

AB Thin solid compns. consist of a ceramic or metallic material A with a surface concentration gradient, and a ceramic or metallic material B having a chemical composition identical or different from that of material A. The preparation of the solid compns. consists in infiltrating a **porous pore**-forming **substrate** with a suspension of material A, evaporating the solvent and debinding before sintering, then optionally **filling** the **pore** volume created at the surface of material A by material B and finally sintering or co-sintering the unit produced. Ceramics, solid electrolyte membranes and the **electrochem.** mixed ionic-electronic conductor cell comprising the electrolyte are also described. The solid electrolyte can be used to extract oxygen from a gas mixture or to analyze for oxygen presence in a gaseous atmospheric The method and solid compns. can also be used for the preparation of ultra-pure oxygen, for the reduction and/or elimination of oxygen from gaseous atmospheres, for heat- and elec. energy production in solid **fuel cells**, to the production of synthesis gas by catalytic **reaction** of natural gas, **water** vapor and oxygen or for industrial preparation of organic compds. by catalytic oxidation Finally, the solid compns. can be used for preparing gas or liquid filtration membranes, ceramic/metal joints, biomaterials and sensors.

ST **pore** infiltration **ceramic** composite electrolyte cell **membrane** filtration oxygen

IT Oxidation
(catalytic; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT Suspensions
(**ceramic**, for **porous substrate** infiltration; preparation of thin **ceramic** composites for oxygen **membrane** filtration and **electrochem.** cells)

IT Joints, mechanical
(ceramic-metal; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT **Membrane** filters
(ceramic; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT Ceramics
(doped; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT Solid electrolytes
(membranes; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT Thermal decomposition
(of ceramic binder; preparation of thin ceramic composites for oxygen

membrane filtration and **electrochem.** cells)

IT Ultrafiltration
(oxygen; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT Ceramic composites
Ceramic membranes
Electrochemical cells
Impregnation
Sensors
Sintering
(preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT **Fuel cells**
(solid electrolyte; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT **Porous** materials
(**substrates**; preparation of thin **ceramic** composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 483278-40-6, Degalan LP 51/07
RL: NUU (Other use, unclassified); USES (Uses)
(binder; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 409-21-2, Silicon carbide (SiC), processes 7758-87-4, Calcium phosphate (Ca3(PO4)2) 12033-89-5, Silicon nitride (Si3N4), processes 51184-13-5, Sialon
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(ceramics; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 12026-18-5, Aluminum magnesium silicate (Al4Mg2Si5O18)
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(cordierite-structured ceramics; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 483278-38-2, Beycostat A 259
RL: MOA (Modifier or additive use); USES (Uses)
(dispersing agent; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 1304-28-5, Barium oxide (BaO), processes 1304-76-3, Bismuth oxide (Bi2O3), processes 1305-78-8, Calcium oxide (CaO), processes 1306-38-3, Cerium oxide (CeO2), processes 1309-48-4, Magnesium oxide (MgO), processes 1312-43-2, Indium oxide (In2O3) 1312-81-8, Lanthanum oxide (La2O3) 1313-96-8, Niobium oxide (Nb2O5) 1314-11-0, Strontium oxide (SrO), processes 1314-20-1, Thorium oxide (ThO2), processes 1314-23-4, Zirconium oxide (ZrO2), processes 1314-36-9, Yttrium oxide (Y2O3), processes 1314-37-0, Ytterbium oxide (Yb2O3) 12024-21-4, Gallium oxide (Ga2O3) 12031-18-4, Lanthanum nickel oxide (LaNiO3) 12055-23-1, Hafnium oxide (HfO2) 12060-08-1, Scandium oxide (Sc2O3) 12060-58-1, Samarium oxide (Sm2O3) 12061-16-4, Erbium oxide (Er2O3) 12064-62-9, Gadolinium oxide (Gd2O3) 39377-48-5, Cobalt lanthanum strontium oxide 56258-26-5, Calcium cobalt lanthanum oxide 57285-40-2, Chromium lanthanum strontium oxide 59707-46-9, Lanthanum manganese strontium oxide 61162-99-0, Cobalt iron lanthanum strontium oxide 123273-09-6, Calcium lanthanum manganese oxide 137633-20-6, Cobalt gadolinium strontium oxide 137633-21-7, Iron lanthanum strontium oxide 262446-07-1, Cobalt iron lanthanum strontium oxide (Co0.8Fe0.2La0.6Sr0.4O2.8)
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(doped ceramics; preparation of thin ceramic composites for oxygen

membrane filtration and **electrochem.** cells)

IT 12167-74-7, Calcium hydroxide phosphate (Ca10(OH)2(PO4)6)
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(hydroxyapatite-structured ceramics; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 12068-56-3, Aluminum silicate (Al6Si2O13)
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(mullite-structured ceramics; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 84-74-2, Butyl phthalate
RL: NUU (Other use, unclassified); USES (Uses)
(preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 131600-18-5, Bicuvox 10
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

IT 9003-07-0, Polypropylene
RL: NUU (Other use, unclassified); USES (Uses)
(wax, particles, substrates; preparation of thin ceramic composites for oxygen **membrane** filtration and **electrochem.** cells)

RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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(2) Dunlop Co Ltd; FR 2023884 A 1970 HCAPLUS
(3) Fraunhofer Ges Forschung; DE 19621638 A 1997 HCAPLUS
(4) Ga, M; WO 9532050 A 1995 HCAPLUS
(5) Gen Motors Corp; EP 0661247 A 1995 HCAPLUS
(6) Kinikoglu, N; WO 9848918 A 1998 HCAPLUS
(7) Man Technologie Gmbh; EP 0212230 A 1987 HCAPLUS
(8) Nabeya Iron And Tool Works; JP 63166776 A 1988 HCAPLUS
(9) Pittsburgh Plate Glass Co; GB 1033560 A 1966
(10) Popa, G; RO 92513 A 1987 HCAPLUS
(11) Saita, K; US 5030396 A 1991
(12) Shinetsu Chem Ind Co; JP 09132459 A HCAPLUS
(13) Sugimoto, Y; US 6103397 A 2000 HCAPLUS
(14) Sumitomo Electric Industries; EP 0710995 A 1996 HCAPLUS

L70 ANSWER 24 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2003:735282 HCAPLUS

DN 139:263298

ED Entered STN: 19 Sep 2003

TI Solid **electrolyte** membranes and their use in **fuel cells** such as polymer **electrolyte fuel cells** and direct methanol polymer **fuel cells**

IN Yamaguchi, Takehisa; Oya, Nobuo; Nakao, Shinichi

PA Japan Science and Technology Corporation, Japan; Ube Industries, Ltd.

SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M008-02
ICS C08J005-22; C08J009-26; H01B001-06; H01M008-10; C08L079-08

CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

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FAN.CNT 2
     PATENT NO.          KIND   DATE        APPLICATION NO.         DATE
     ---------------     ----   --------    --------------------    --------
PI   JP 2003263998        A2    20030919    JP 2002-61917           20020307
     WO 2003081706        A1    20031002    WO 2003-JP2630          20030306
         W:  AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,
             CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
             GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS,
             LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL,
             PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA,
             UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
         RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,
             KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,
             FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR,
             BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
     US 2005118479        A1    20050602    US 2003-506717          20030306
PRAI JP 2002-61917        A     20020307
     JP 2002-372154       A     20021224
     JP 2003-35968        A     20030214
     WO 2003-JP2630       W     20030306
CLASS
 PATENT NO.      CLASS  PATENT FAMILY CLASSIFICATION CODES
 -------------   -----  ----------------------------------------------
 JP 2003263998   ICM    H01M008-02
                 ICS    C08J005-22; C08J009-26; H01B001-06; H01M008-10;
                        C08L079-08
 US 2005118479   NCL    429/033.000; 521/027.000
```

AB The **electrolyte** membranes consist of **porous substrates** comprising **polyimides** and/or polyamides having their **pores filled** with **proton-conducting** polymers. The membranes show excellent methanol permeability-preventing properties.

ST solid **electrolyte membrane** polyamide substrate; **porous polyimide** solid **electrolyte membrane**; direct methanol polymer **fuel cell electrolyte**; polymer **electrolyte fuel cell**

IT **Polyimides**, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(polyether-; **porous** polyamide/**polyimide substrates filled** with **proton-conducting** polymers as polymer **electrolytes** in (direct methanol) polymer **fuel cells**)

IT Polyethers, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**polyimide**-; **porous** polyamide/**polyimide substrates filled** with **proton-conducting** polymers as polymer **electrolytes** in (direct methanol) polymer **fuel cells**)

IT Ionic **conductors**
(polymeric, **proton-conducting**; **porous** polyamide/**polyimide substrates filled** with **proton-conducting** polymers as polymer **electrolytes** in (direct methanol) polymer **fuel cells**)

IT **Fuel cell electrolytes**
Polymer **electrolytes**
(**porous** polyamide/**polyimide substrates**

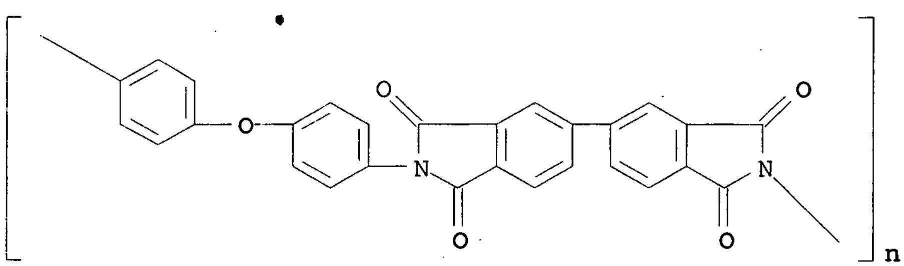
filled with proton-conducting polymers as
polymer electrolytes in (direct methanol) polymer
fuel cells)

IT Polyamides, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PREP
(Preparation); USES (Uses)
(porous polyamide/polyimide substrates
filled with proton-conducting polymers as
polymer electrolytes in (direct methanol) polymer
fuel cells)

IT **26615-45-2P** 69824-22-2P 85947-90-6P, 3,3',4,4'-
Biphenyltetracarboxylic acid-4,4'-diaminodiphenyl ether copolymer
601480-72-2P
RL: DEV (Device component use); IMF (Industrial manufacture); PREP
(Preparation); USES (Uses)
(porous polyamide/polyimide substrates
filled with proton-conducting polymers as
polymer electrolytes in (direct methanol) polymer
fuel cells)

IT **26615-45-2P**
RL: DEV (Device component use); IMF (Industrial manufacture); PREP
(Preparation); USES (Uses)
(porous polyamide/polyimide substrates
filled with proton-conducting polymers as
polymer electrolytes in (direct methanol) polymer
fuel cells)

RN 26615-45-2 HCAPLUS
CN Poly[(1,1',3,3'-tetrahydro-1,1',3,3'-tetraoxo[5,5'-bi-2H-isoindole]-2,2'-
diyl)-1,4-phenyleneoxy-1,4-phenylene] (9CI) (CA INDEX NAME)



L70 ANSWER 25 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2003:317726 HCAPLUS
DN 138:324092
ED Entered STN: 25 Apr 2003
TI Polymer **electrolyte membrane**, its manufacture, and
solid polymer **fuel cell** using the **membrane**
IN Kono, Satoshi; Kitai, Masayuki
PA Toray Industries, Inc., Japan
SO Jpn. Kokai Tokkyo Koho, 17 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01B001-06; H01B013-00; H01M008-10
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy
Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003123792	A2	20030425	JP 2001-311240	20011009
PRAI	JP 2001-311240		20011009		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2003123792	ICM	H01M008-02
	ICS	H01B001-06; H01B013-00; H01M008-10

AB The **membrane** has a **proton conductor filled** on a **porous substrate**; where ≥1 side of the substrate has the **proton conductor** layer. The **membrane** is manufactured by preparing the substrate with using photolithog. or wet solidification technique.

ST **fuel cell** polymer **electrolyte membrane** manuf; polymer **electrolyte membrane proton conductor filled porous substrate**

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(fluorine- and sulfo-containing, ionomers; polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

IT **Fuel cell electrolytes**
(polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylene-, sulfo-containing, ionomers; polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

IT Ionomers
RL: DEV (Device component use); USES (Uses)
(polyoxyalkylenes, fluorine- and sulfo-containing; polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

IT **Polyimides**, uses
RL: DEV (Device component use); USES (Uses)
(**porous substrate**; polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(substrate; polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

IT 27028-97-3D, Polyphenylene sulfide sulfone, sulfonated 28212-48-8D, Polydiphenoxyphosphazene, sulfonated
RL: DEV (Device component use); USES (Uses)
(polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

IT 24937-79-9, PVDF
RL: DEV (Device component use); USES (Uses)
(substrate; polymer **electrolyte** membranes containing **proton conductor** coated **porous substrates** for **fuel cells**)

L70 ANSWER 26 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2003-876937 [81] WPIX
DNN N2003-700347 DNC C2003-247509
TI Organic solutions useful for insertion of nano-particles within **pores** of polymeric or **inorganic porous membranes** useful for electrical vehicles, comprise metal salts and oxo acids of phosphorus.
DC A85 E11 L03 X16
IN ALBERTI, G; CASCIOLA, M; PICA, M
PA (FUMA-N) FUMA TECH GMBH; (FUMA-N) FUMA TECH GES FUNKTIONELLE MEMBRANEN; (ALBE-I) ALBERTI G; (CASC-I) CASCIOLA M; (PICA-I) PICA M
CYC 103
PI WO 2003081691 A2 20031002 (200381)* EN 31 H01M000-00
RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PH PL PT RO RU SC SD SE SG SK SL TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
AU 2003226671 A1 20031008 (200432) H01M000-00
KR 2004101350 A 20041202 (200525) H01M004-86
US 2005164092 A1 20050728 (200550) H01M010-40
ADT WO 2003081691 A2 WO 2003-EP2904 20030320; AU 2003226671 A1 AU 2003-226671 20030320; KR 2004101350 A KR 2004-715060 20040922; US 2005164092 A1 WO 2003-EP2904 20030320, US 2005-508748 20050207
FDT AU 2003226671 A1 Based on WO 2003081691
PRAI IT 2002-PG15 20020322
IC ICM H01M000-00; H01M004-86; H01M010-40
ICS C08J005-22; H01M004-88; **H01M008-02**
AB WO2003081691 A UPAB: 20040426
NOVELTY - Organic solutions comprise metal (IV) salts and oxo acids of phosphorus from which, after evaporation of the solvent, insoluble compounds of can be obtained.

DETAILED DESCRIPTION - Organic solutions comprise metal (IV) salts and oxo acids of phosphorus from which, after evaporation of the solvent, insoluble compounds of general composition M(IV)(O3P-G)2-n(O3P-R1-X)n can be obtained.

M(IV) = tetravalent metal;
-G = generic inorganic or organic group;
-R1- = organic group;
-X = acid group;
n = 0-1.5.

INDEPENDENT CLAIMS are also included for:

(a) a method for the **filling** of **porous membranes** with tetravalent metal salts, especially phosphate-phosphonates, comprising preparing the organic solution that may contain a polymer and/or an ionomer of the state of the art; impregnating the porous **membrane** with the solution; eliminating the solvent; and repeating the impregnation and the elimination until the desired percentage of **pore filling** is obtained;

(b) proton conducting composite **membranes** made of polymeric or **inorganic porous membranes** with **pores filled** with tetravalent metal salts, especially phosphate-phosphonates, or mixtures of the compounds with a proton conducting ionomer and specially prepared using the solutions as above;

(c) composite **membranes** comprising a **porous ceramic membrane** partially **filled** with a tetravalent metal salt, preferably phosphate-phosphonate as above, exhibiting catalytic activity;

(d) a method for the preparation of nano-polymers and nano-ionomers comprising preparing an organic solution having one of the compositions reported above and at the same time containing a polymer and/or ionomer of the state of the art; and eliminating the solvent by evaporation or with a non-solvent of the polymer or ionomer;

(e) use of proton conducting **membranes** constituted by **inorganic** or polymeric **porous membranes** with **pores filled** with tetravalent metal salts, preferably phosphate-phosphonates and of **membranes** constituted by nano-polymers in electrochemical devices specifically planned for generating electrical energy from the oxidation of a fuel; and

(f) use of proton conducting composite **membranes** and composite **membranes** in catalytic **membrane** reactors.

USE - Useful for the insertion of nano-particles, preferably a large variety of lamellar nano-particles of tetravalent metal salts, preferably phosphate-phosphonates, within the **pores** of polymeric or **inorganic porous membranes**, or in the **membrane**/electrode interfaces useful for electrical vehicles and/or for portable electrical devices (claimed).

ADVANTAGE - The inventive organic solutions produce composite **membranes** with improved global performance of ionomeric **membranes** of the state of the art in hydrogen, indirect methanol and direct methanol fuel cells.

Dwg.0/1

FS CPI EPI
FA AB; DCN
MC CPI: A12-E06B; E05-F02; E05-G02; E05-G03D; E05-L01; E05-M; E05-P; E31-K05; L03-E04B
EPI: X16-C; X16-E06A

L70 ANSWER 27 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2003-845085 [78] WPIX
DNN N2003-675481 DNC C2003-237374
TI Electrolyte film for fuel cell, formed by filling polymer derived from 2-acrylamido-2-methyl-propane sulfonic acid having proton conductivity in **pores** of **substrate** which does not swell with organic solvent containing methanol, or water.
DC A14 A85 L03 X12 X16
IN HIRAOKA, H; NAKAO, S; YAMAGUCHI, T
PA (KAGA-N) KAGAKU GIJUTSU SHINKO JIGYODAN; (TOAG) TOA GOSEI CHEM IND LTD; (NISC-N) JAPAN SCI & TECHNOLOGY CORP; (TOAG) TOA GOSEI KK
CYC 28
PI WO 2003075385 A1 20030912 (200378)* JA 25 H01M008-02 <--
RW: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE SI SK TR
W: JP US
JP 2005071609 A 20050317 (200520) 12 H01M008-02 <--
ADT WO 2003075385 A1 WO 2003-JP2629 20030306; JP 2005071609 A JP 2002-61918 20020307
PRAI JP 2002-61918 20020307
IC ICM **H01M008-02**
ICS C08F002-00; C08F020-58; H01B001-06; **H01M008-10**
AB WO2003075385 A UPAB: 20031203

NOVELTY - Electrolyte film is formed by filling a first polymer having proton conductivity in **pores** of a **porous substrate** which does not swell with an organic solvent containing methanol, or water. The first polymer is a polymer derived from 2-acrylamido-2-methyl-propane sulfonic acid.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a fuel cell having the film, such as a solid polymer fuel cell or a direct

methanol fuel cell.
USE - Used in the production of a solid polymer fuel cell or a direct methanol fuel cell.
ADVANTAGE - The electrolyte film allows excellent inhibition of permeation of methanol, exhibits no or reduced change in its area, and has excellent proton conductivity.
DESCRIPTION OF DRAWING(S) - Figure 1 is a graph of **membrane** area change ratio (%) and proton conductivity (S/cm).
Dwg.1/4

FS CPI EPI
FA AB; GI
MC CPI: A04-A; A04-D04A; A12-E06B; L03-E04A2
EPI: X12-D01C1; X16-C01C; X16-J01A

L70 ANSWER 28 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2003:613609 HCAPLUS
DN 139:365891
ED Entered STN: 11 Aug 2003
TI Polymer **electrolyte** membranes with a **pore-filling** structure for a direct methanol **fuel cell**
AU Yamaguchi, Takeo; Miyata, Fusae; Nakao, Shin-ichi
CS Department of Chemical System Engineering, The University of Tokyo, Tokyo, 113-8656, Japan
SO Advanced Materials (Weinheim, Germany) (2003), 15(14), 1198-1201
CODEN: ADVMEW; ISSN: 0935-9648
PB Wiley-VCH Verlag GmbH & Co. KGaA
DT Journal
LA English
CC 38-3 (Plastics Fabrication and Uses)
AB A **pore-filling** type **electrolyte membrane** was developed for use in direct methanol **fuel cells. Pores** of a **porous substrate** are **filled** with a polyelectrolyte. The filling polymer exhibits **proton conductance** and the porous matrix inhibits polymer **swelling**, which reduces **MeOH** crossover.
ST **porous membrane** polyelectrolyte **filled** direct methanol **fuel cell**
IT **Fuel cell electrolytes**
Fuel cells
Membranes, nonbiological
Polyelectrolytes
(polyelectrolyte membranes with **pore-filling** structure for direct methanol **fuel cell**)
IT Fluoropolymers, uses
Polyimides, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous membrane**; polyelectrolyte membranes with **pore-filling** structure for direct methanol **fuel cell**)
IT 9002-88-4, Polyethylene
RL: TEM (Technical or engineered material use); USES (Uses)
(crosslinked, porous **membrane**; polyelectrolyte membranes with **pore-filling** structure for direct methanol **fuel cell**)
IT 67-56-1, Methanol, uses 620598-99-4, Methylenebisacrylamide-2-Propanesulfonic acid, 2-methyl-1-[(1-oxo-2-propenyl)amino] copolymer
RL: TEM (Technical or engineered material use); USES (Uses)
(polyelectrolyte membranes with **pore-filling** structure for direct methanol **fuel cell**)

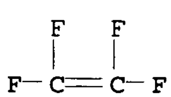
IT 9002-84-0, PTFE
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous membrane**; polyelectrolyte membranes with **pore-filling** structure for direct methanol **fuel cell**)
RE.CNT 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE

(1) Baradie, B; J Electroanal Chem 2000, V489, P101 HCAPLUS
(2) Depre, L; Electrochim Acta 2000, V45, P1377 HCAPLUS
(3) Kreuer, K; J Membr Sci 2001, V185, P29 HCAPLUS
(4) Lehtinen, T; Electrochim Acta 1998, V43, P1881 HCAPLUS
(5) Liu, W; J New Mater Electrochem Syst 2001, V4, P227 HCAPLUS
(6) Mika, A; J Membr Sci 1997, V135, P81 HCAPLUS
(7) Miyake, N; J Electrochem Soc 2001, V148, PA905 HCAPLUS
(8) Penner, R; J Electrochem Soc 1985, V132, P514 HCAPLUS
(9) Rikukawa, M; Prog Polym Sci 2000, V25, P1463 HCAPLUS
(10) Scott, K; J Membr Sci 2000, V171, P119 HCAPLUS
(11) Yamaguchi, T; Electrochemistry 2002, V70, P950 HCAPLUS
(12) Yamaguchi, T; J Electrochem Soc 2002, V149, P1448
(13) Yamaguchi, T; J Membr Sci 2003, V214, P283 HCAPLUS
(14) Yamaguchi, T; J Polym Sci, Polym Phys Ed 1997, V35, P469 HCAPLUS
(15) Yamaguchi, T; Macromolecules 1991, V24, P5522 HCAPLUS
(16) Yang, C; Solid State Lett 2001, V4, PA31 HCAPLUS
(17) Zawodzinski, T; Solid State Ionics 1993, V60, P199 HCAPLUS

IT 9002-84-0, PTFE
RL: TEM (Technical or engineered material use); USES (Uses)
(**porous membrane**; polyelectrolyte membranes with **pore-filling** structure for direct methanol **fuel cell**)
RN 9002-84-0 HCAPLUS
CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3
CMF C2 F4



L70 ANSWER 29 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2003:216130 HCAPLUS
DN 138:388079
ED Entered STN: 20 Mar 2003
TI **Pore-filling** type polymer **electrolyte** membranes for a direct methanol **fuel cell**
AU Yamaguchi, Takeo; Miyata, Fusae; Nakao, Shin-Ichi
CS Department of Chemical System Engineering, The University of Tokyo, Bunkyo-ku, Tokyo, 113-8656, Japan
SO Journal of Membrane Science (2003), 214(2), 283-292
CODEN: JMESDO; ISSN: 0376-7388
PB Elsevier Science B.V.
DT Journal
LA English
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)

AB **Pore-filling electrolyte** membranes have been prepared for use as **electrolyte** membranes in a direct methanol **fuel cell.** The **pores** of a **porous substrate** were **filled** with a polymer **electrolyte** , with the **membrane** swelling being suppressed by the substrate matrix. **Proton conductivity** occurred through the filling **electrolyte** polymer. Swelling of the **electrolyte** polymer was used to control **methanol permeation,** and the substrate had good mech. strength at high temperature We developed a **membrane** that consisted of a vinylsulfonic acid-acrylic acid crosslinked polymer gel in a **porous** polytetrafluoroethylene **substrate.** This polymer had a high **proton cond** . with reduced **membrane** methanol permeability, and was thermally stable to 130°.

ST polymer **electrolyte membrane pore filling** direct methanol **fuel cell**; acrylic acid vinylsulfonic acid polymer **electrolyte membrane pore filling**

IT Fluoropolymers, uses
RL: DEV (Device component use); USES (Uses)
(**membrane** containing **substrate** of; **pore-filling** type polymer **electrolyte** membranes for direct methanol **fuel cells**)

IT **Fuel cell electrolytes**
(**pore-filling** type polymer **electrolyte** membranes for direct methanol **fuel cells**)

IT 25053-28-5, Acrylic acid-vinylsulfonic acid copolymer
RL: DEV (Device component use); USES (Uses)
(crosslinked; **pore-filling** type polymer **electrolyte** membranes for direct methanol **fuel cells**)

IT **9002-84-0**, PTFE
RL: DEV (Device component use); USES (Uses)
(**membrane** containing **substrate** of; **pore-filling** type polymer **electrolyte** membranes for direct methanol **fuel cells**)

RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
(1) Baradie, B; J Electroanal Chem 2000, V489, P101 HCAPLUS
(2) Depre, L; Electrochim Acta 2000, V45, P1377 HCAPLUS
(3) Florjanczyk, Z; Solid State Ionics 2001, V145, P119 HCAPLUS
(4) Honma, I; Solid State Ionics 1999, V120, P255 HCAPLUS
(5) Jiang, D; Polym Degr Stab 1999, V63, P423 HCAPLUS
(6) Jou, J; J Membr Sci 1999, V162, P269 HCAPLUS
(7) Kai, T; Ind Eng Chem Res 2000, V39, P3284 HCAPLUS
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(20) Yamaguchi, T; J Electrochem Soc 2002, V149, P1448
(21) Yamaguchi, T; J Membr Sci 2001, V194, P217 HCAPLUS
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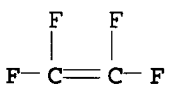
IT **9002-84-0**, PTFE
RL: DEV (Device component use); USES (Uses)
(**membrane** containing **substrate** of; **pore-filling** type polymer **electrolyte** membranes for direct methanol **fuel cells**)

RN 9002-84-0 HCAPLUS
CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3
CMF C2 F4



L70 ANSWER 30 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2003:251030 HCAPLUS
DN 139:24074
ED Entered STN: 02 Apr 2003
TI Development of **pore-filling** type polymer **electrolyte membrane** made by plasma graft polymerization with PTFE substrate
AU Yamaguchi, Takeo; Kasahara, Seiji; Nakao, Shin-Ichi
CS Department of Chemical System Engineering, The University of Tokyo, Tokyo, 113-8656, Japan
SO Kagaku Kogaku Ronbunshu (2003), 29(2), 159-164
CODEN: KKRBAW; ISSN: 0386-216X
PB Kagaku Kogakkai
DT Journal
LA Japanese
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

AB A **pore-filling** type **electrolyte membrane** was developed for use in direct methanol **fuel cells**. **Pores** of a **porous substrate** are **filled** with polyelectrolyte polymer. The filling polymer exhibits p conductance and the porous matrix inhibits polymer **swelling**, which reduces **MeOH** crossover, and it also provides mech. strength at high temperature The **pore-filling electrolyte membrane** was made by plasma graft polymerization Poly(tetrafluoroethylene) (PTFE) was employed as the substrate and poly(acrylic acid) or poly(acrylic acid-co-allyl sulfonate) was used as the **filling grafted polymer.** Using a plasma power of 30 W, **pores** of the PTFE **substrate** were homogeneously **filled** with the **grafting polymer** . For the poly(acrylic acid-co-allyl sulfonate) grafted polymer, the grafting rate and allyl sulfonate content were enhanced by adding salt to the monomer solution This may reduce the double charge layer thickness of the sulfonic group and enhance the reactivity of allyl sulfonate. The membranes contain 0.48 mmol sulfonic groups/g-**membrane.**

ST polymer **electrolyte membrane** direct methanol

fuel cell; polytetrafluoroethylene polyacrylic acid
allylsulfonate graft polymn

IT **Polymerization**
(**graft**, plasma; **pore-filling**
polymer electrolyte membrane made by plasma
graft polymerization with poly(tetrafluoroethylene) substrate for direct
methanol **fuel cells**)

IT **Fuel cell electrolytes**
Fuel cell separators
Polyelectrolytes
(**pore-filling** polymer **electrolyte**
membrane made by plasma graft polymerization with
poly(tetrafluoroethylene) substrate for direct methanol **fuel**
cells)

IT Fluoropolymers, uses
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**substrate**; **pore-filling** polymer
electrolyte membrane made by plasma graft polymerization
with poly(tetrafluoroethylene) substrate for direct methanol
fuel cells)

IT 7647-14-5, Sodium chloride (NaCl), uses
RL: NUU (Other use, unclassified); USES (Uses)
(plasma graft polymerization of poly(acrylic acid-co-allyl sulfonate) with
poly(tetrafluoroethylene) substrate accelerated by sodium chloride for
fabrication of polymer electrolyte membranes for direct methanol
fuel cells)

IT 9003-01-4, Poly(**acrylic** acid) 73144-86-2
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**pore-filling** polymer **electrolyte**
membrane made by plasma graft polymerization with
poly(tetrafluoroethylene) substrate for direct methanol **fuel**
cells)

IT **9002-84-0**, Poly(**tetrafluoroethylene**)
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**substrate**; **pore-filling** polymer
electrolyte membrane made by plasma graft polymerization
with poly(tetrafluoroethylene) substrate for direct methanol
fuel cells)

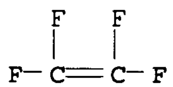
IT **9002-84-0**, Poly(**tetrafluoroethylene**)
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(**substrate**; **pore-filling** polymer
electrolyte membrane made by plasma graft polymerization
with poly(tetrafluoroethylene) substrate for direct methanol
fuel cells)

RN 9002-84-0 HCAPLUS

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3
CMF C2 F4



L70 ANSWER 31 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2003:239623 HCAPLUS
DN 139:263107
ED Entered STN: 28 Mar 2003
TI Systematic approach to design polymer **electrolyte** membranes
AU Nishimura, Hironobu; Yamaguchi, Takeo
CS Department of Chemical System Engineering, The University of Tokyo, Bunkyo-ku, Tokyo, 113-8656, Japan
SO Maku (2003), 28(1), 21-28
CODEN: MAKUD9; ISSN: 0385-1036
PB Nippon Maku Gakkai
DT Journal; General Review
LA Japanese
CC 52-0 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
AB A review of polymer **electrolyte** membranes (PEM) for **fuel cells**, with emphasis on different **membrane** materials, **pore-filling** membranes (composed of a **substrate** matrix and a filling polymer), the relationship of suppression of methanol permeability and **proton conductivity**, and the structural design of entire **fuel cell** systems. In addition to this, a math. model, which can couple the performance of PEM with its **fuel cell** performance, was developed and subsequently used for selecting appropriate **membrane** for applications. The **fuel cell** performance was estimated with the model based on some parameters, divided into physicochem. and structural properties. Some guideline and information were obtained to design or select the materials, i.e., higher **proton conductive membrane** should be selected when higher c.d. is needed, whereas lower methanol permeable membranes should be selected when a higher voltage is needed. **Fuel cell** systems have complicated hierarchical structures. Therefore, it becomes virtually impossible to solve some problems for **fuel cell** application with partially specialized knowledge.
ST review engineering design polymer **electrolyte membrane fuel cell**; **pore filling membrane fuel cell** review; **proton cond fuel cell** polymer **membrane** review
IT Permeability
(inhibition of, of methanol; systematic approach to design of polymer **electrolyte** membranes for **fuel cells**)
IT Ionic **conductivity**
(**proton**; systematic approach to design of polymer **electrolyte** membranes for **fuel cells**)
IT **Fuel cell** separators
Simulation and Modeling, physicochemical
(systematic approach to design of polymer **electrolyte** membranes for **fuel cells**)
IT 67-56-1, Methanol, processes
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)

(permeability suppression of; systematic approach to design of polymer **electrolyte** membranes for **fuel cells**)

L70 ANSWER 32 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2002:216383 HCAPLUS
DN 136:234757
ED Entered STN: 22 Mar 2002
TI **Electrolyte membrane, fuel cell,** and manufacture of the **membrane** and the cell
IN Yamaguchi, Takeo; Nakao, Shinichi
PA Foundation for Scientific Technology Promotion, Japan
SO Jpn. Kokai Tokkyo Koho, 11 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M008-02
ICS C08J009-40; H01M008-10; C08L027-18; C08L079-08
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002083612	A2	20020322	JP 2000-272203	20000907
PRAI	JP 2000-272203		20000907		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2002083612	ICM	H01M008-02
	ICS	C08J009-40; H01M008-10; C08L027-18; C08L079-08

AB The **electrolyte membrane** has a H conductive polymer **filled** in the **pores** of a **MeOH**- and **H2O** -non-**swellable porous substrate.** The **membrane** is prepared by bonding a 1st polymer with its 1 end to the **pores** of a **porous substrate, swell** resistant to **organic solvent** or water, and bonding a 2nd polymer to the other end of the 1st polymer; where the 2 polymers are the same or different but are both H conductive. The **fuel cell** has the **electrolyte membrane** between a cathode and an anode, and is prepared by forming a 1st electrode from a sol, forming a porous film on the electrode, forming an **electrolyte membrane** by the above method using the porous film, and applying a 2nd electrode on the **electrolyte membrane.**
ST **fuel cell proton conducting** polymer **electrolyte membrane** manuf
IT **Fuel cell electrolytes**
(structure and manufacture of **proton conducting** polymer grafted in porous Teflon membranes for **fuel cell electrolytes**)
IT Fluoropolymers, uses
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(structure and manufacture of **proton conducting** polymer grafted in porous Teflon membranes for **fuel cell electrolytes**)
IT 9002-84-0, Teflon
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(structure and manufacture of **proton conducting** polymer grafted in porous Teflon membranes for **fuel cell electrolytes**)

IT 79-10-7, Acrylic acid, uses 1184-84-5, Vinylsulfonic acid
RL: MOA (Modifier or additive use); USES (Uses)
(structure and manufacture of **proton conducting** polymer grafted in porous Teflon membranes for **fuel cell electrolytes**)

L70 ANSWER 33 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2002:216370 HCAPLUS
DN 136:265786
ED Entered STN: 22 Mar 2002
TI **Proton-conducting membrane** or film, its manufacture, and **fuel cell** using it
IN Fujita, Shigeru; Abe, Masao
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01B001-06
ICS C08F002-00; C08J009-36; C08J009-40; H01B013-00; H01M008-02; H01M008-10; C08L023-02; C08L027-12
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002083514	A2	20020322	JP 2000-275015	20000906
PRAI	JP 2000-275015		20000906		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2002083514	ICM	H01B001-06
	ICS	C08F002-00; C08J009-36; C08J009-40; H01B013-00; H01M008-02; H01M008-10; C08L023-02; C08L027-12

AB The **proton-conducting membrane** comprises a **porous membrane filled** with a polymer having a phosphate-, phosphonate-, or phosphinate group at side chain in pores. A **proton-conducting** film consists of the above **membrane**, where a part of voids in the pores are closed. The **membrane** is manufactured by impregnating a monomer having a phosphate-, phosphonate-, or phosphinate side chain in a porous **membrane** and then polymerizing in the pores. The film is manufactured from the **membrane** by closing the pores. Also claimed is a **fuel cell** equipped with the **membrane** or the film as a proton-exchange **membrane.** The **membrane** and the film have high durability and strength.
ST **proton conducting** polymer **membrane** film phosphate phosphonate phosphinate group; **fuel cell proton conducting** polymer **membrane**
IT Fluoropolymers, uses
Polyolefins
RL: DEV (Device component use); USES (Uses)
(**porous substrates; proton-conducting membrane** or film containing polymer having phosphate-, phosphonate-, or phosphinate side chain for **fuel cell**)
IT Films
Fuel cell electrolytes
Ionic **conductors**

Membranes, nonbiological
(**proton-conducting membrane** or film
containing polymer having phosphate-, phosphonate-, or phosphinate side
chain for **fuel cell**)
IT **Fuel cells**
(solid **electrolyte**; **proton-conducting**
membrane or film containing polymer having phosphate-,
phosphonate-, or phosphinate side chain for **fuel cell**
)
IT 9002-88-4, Polyethylene
RL: DEV (Device component use); USES (Uses)
(UHMWPE, **porous substrate**; **proton-**
conducting membrane or film containing polymer having
phosphate-, phosphonate-, or phosphinate side chain for **fuel**
cell)
IT 51131-63-6P, Light Ester P 1M homopolymer 103719-23-9P, Butyl
acrylate-Light Ester P 1M copolymer
RL: DEV (Device component use); IMF (Industrial manufacture); PREP
(Preparation); USES (Uses)
(**proton-conducting membrane** or film
containing polymer having phosphate-, phosphonate-, or phosphinate side
chain for **fuel cell**)

L70 ANSWER 34 OF 42 WPIX
AN 2003-202991 [20] WPIX
DNN N2003-161703 DNC C2003-051935
TI Asymmetric composite **membrane** for fuel cell **membrane**
electrode assembly, is gas impermeable and has a **porous** major
surface and **porous** polymeric **substrate** with preset
residual **porosity.**
DC A18 A28 A85 L03 X16
IN STONE, C; SUMMERS, D A
PA (BALL-N) BALLARD POWER SYSTEMS INC; (STON-I) STONE C; (SUMM-I) SUMMERS D A
CYC 28
PI EP 1263066 A2 20021204 (200320)* EN 21 H01M008-02 <--
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT
RO SE SI TR
CA 2387210 A1 20021121 (200320) EN H01M004-94
US 2003059657 A1 20030327 (200325) H01M008-10 <--
US 6689501 B2 20040210 (200413) H01M008-02 <--
ADT EP 1263066 A2 EP 2002-11477 20020524; CA 2387210 A1 CA 2002-2387210
20020522; US 2003059657 A1 US 2001-866387 20010525; US 6689501 B2 US
2001-866387 20010525
PRAI US 2001-866387 20010525
IC ICM H01M004-94; **H01M008-02**; **H01M008-10**
ICS C08J005-22; H01M002-14; H01M002-16
AB EP 1263066 A UPAB: 20030324
NOVELTY - Asymmetric composite **membrane** is gas impermeable, has
a **porous** polymeric **substrate** (2) with greater than 10%
residual porosity, an impregnant and a dense surface layer comprising a
cation exchange material and a porous major surface. Impregnant partially
fills the substrate such that the **substrate** has region (4) with
pores filled with impregnant, contiguous with dense
layer and porous region (6).
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the
following:
(1) **membrane** electrode assembly comprising the composite
membrane; and
(2) fuel cell comprising the composite **membrane.**
USE - For **membrane** electrode assembly of fuel cell (both

claimed) such as solid polymer electrolyte fuel cell, chloro-alkali electrolysis cell and batteries, and in diffusion dialysis, electrodialysis, pervaporation and vapor permeation applications.

ADVANTAGE - The composite **membrane** is economically and easily produced.

DESCRIPTION OF DRAWING(S) - The figure shows a schematic representation of the composite **membrane.**

Porous substrate 2

Region having **pores filled** with impregnant 4

Porous region 6

Dwg.1A/8

FS CPI EPI
FA AB; GI
MC CPI: A12-E06B; A12-E09; A12-M; L03-E04A2; L03-E04G
EPI: X16-C01C; X16-F02

L70 ANSWER 35 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2002:781958 HCAPLUS
DN 138:224060
ED Entered STN: 14 Oct 2002
TI A **Pore-Filling Electrolyte Membrane** -Electrode Integrated System for a Direct Methanol **Fuel Cell** Application
AU Yamaguchi, Takeo; Ibe, Masaya; Nair, Balagopal N.; Nakao, Shin-ichi
CS Department of Chemical System Engineering, The University of Tokyo, Bunkyo-ku, Tokyo, 113-8656, Japan
SO Journal of the Electrochemical Society (2002), 149(11), A1448-A1453
CODEN: JESOAN; ISSN: 0013-4651
PB Electrochemical Society
DT Journal
LA English
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
AB A novel **electrolyte membrane** is needed to develop a high performance direct methanol **fuel cell.** This **membrane** should be durable up to 130° to improve the catalytic **reaction** and **MeOH** crossover should be reduced. A **pore-filled** polyelectrolyte **membrane** was designed where the polyelectrolyte is **filled** into the **pores** of a **porous substrate.** This creates an integrated system with a **membrane** and a catalyst layer. The **porous substrate** was completely inert to aqueous MeOH solution and was durable at high temperature The substrate matrix could suppress **membrane swelling** to reduce **MeOH** crossover and had mech. strength at high temps. A radical polymerization technique was used to fabricate the **pore-filling membrane.** A **porous SiO2** sol-gel thin-**base membrane** on a C electrode was used as a **membrane**-electrode integrated system. The **substrate pores** were **filled** with an **acrylic** acid-vinylsulfonic acid copolymer network. The membranes showed high **proton conductivity**, thermal stability, and low **MeOH permeation.**
ST **fuel cell electrolyte membrane**
electrode polymer **porous silica**; acrylic acid vinylsulfonic acid polymer **electrolyte fuel cell**
IT **Fuel cell** electrodes
Fuel cell electrolytes
(polymer **electrolyte-filled porous**

silica membrane integrated with electrode for direct
methanol **fuel cells**)

IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); USES (Uses)
(electrode; polymer **electrolyte-filled porous silica membrane** integrated with electrode for direct methanol **fuel cells**)

IT 25053-28-5, Acrylic acid-vinylsulfonic acid copolymer 501005-91-0
RL: DEV (Device component use); USES (Uses)
(**electrolyte**; polymer **electrolyte-filled porous silica membrane** integrated with electrode for direct methanol **fuel cells**)

IT 7631-86-9, **Silica**, uses
RL: DEV (Device component use); USES (Uses)
(**substrate**; polymer **electrolyte-filled porous silica membrane** integrated with electrode for direct methanol **fuel cells**)

RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD

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(2) Depre, L; Electrochim Acta 2000, V45, P1377 HCAPLUS
(3) Honma, I; Solid State Ionics 1999, V120, P255 HCAPLUS
(4) Jou, J; J Membr Sci 1999, V162, P269 HCAPLUS
(5) Kai, T; Ind Eng Chem Res 2000, V39, P3284 HCAPLUS
(6) Lehtinen, T; Electrochim Acta 1998, V43, P1881 HCAPLUS
(7) Mika, A; J Membr Sci 1997, V135, P81 HCAPLUS
(8) Ulbricht, M; J Membr Sci 1997, V136, P25 HCAPLUS
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(13) Yamaguchi, T; Ind Eng Chem Res 1992, V31, P1914 HCAPLUS
(14) Yamaguchi, T; Ind Eng Chem Res 1993, V32, P848 HCAPLUS
(15) Yamaguchi, T; J Membr Sci 1994, V95, P39 HCAPLUS
(16) Yamaguchi, T; J Membr Sci, In press
(17) Yamaguchi, T; J Membr Sci, Submitted
(18) Yamaguchi, T; Macromolecules 1991, V24, P5522 HCAPLUS

L70 ANSWER 36 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2002:951780 HCAPLUS
DN 138:306648
ED Entered STN: 17 Dec 2002
TI Plasma-graft pore-filling electrolyte membranes using a **porous** poly(**tetrafluoroethylene**) **substrate**
AU Yamaguchi, Takeo; Hayashi, Hideki; Kasahara, Seiji; Nakao, Shin-Ichi
CS Department of Chemical System Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-8656, Japan
SO Electrochemistry (Tokyo, Japan) (2002), 70(12), 950-952
CODEN: EECTFA; ISSN: 1344-3542
PB Electrochemical Society of Japan
DT Journal
LA English
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38
AB A pore-filling **electrolyte membrane** was prepared by plasma-**graft filling polymerization** as an **electrolyte membrane** for a direct methanol **fuel cell.** The **pores** of a **porous** poly(**tetrafluoroethylene**) **substrate** were **filled**

with poly(**acrylic** acid) **grafted polymer.**
Grafted polymer formation through the **substrate** was homogeneous and the **pore**-filling **membrane** was obtained by this technique. The **membrane** showed low methanol permeability, and heat resistance to 180° was achieved during the operation period.

ST plasma **graft polymn** pore **filling** **electrolyte membrane** microporous; methanol **fuel cell electrolytic membrane** tetrafluoroethylene acrylic acid copolymer

IT Fluoropolymers, uses
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**acrylic**, graft; plasma-graft pore-**filling** electrolyte membranes using **porous** poly(**tetrafluoroethylene) substrate**)

IT **Fuel cell** separators
(electrolyte-filled pores; plasma-graft pore-filling electrolyte membranes using **porous** poly(**tetrafluoroethylene**) **substrate**)

IT Pore
(**filled** during plasma **graft polymerization**; plasma-**graft** pore-**filling** electrolyte membranes using **porous** poly(**tetrafluoroethylene**) **substrate**)

IT Acrylic **polymers**, uses
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(fluorine-containing, **graft**; plasma-graft pore-**filling** electrolyte membranes using **porous** poly(**tetrafluoroethylene) substrate**)

IT **Polymerization**
(**graft**, plasma; plasma-**graft** pore-**filling** electrolyte membranes using **porous** poly(**tetrafluoroethylene) substrate**)

IT Thermal resistance
(increased over Nafion control; plasma-graft pore-filling electrolyte membranes using **porous** poly(**tetrafluoroethylene**) **substrate**)

IT Pervaporation
(membranes; plasma-graft pore-filling electrolyte membranes using **porous** poly(**tetrafluoroethylene) substrate**)

IT **Fuel cell** electrolytes
Fuel cells
Permeability
Polyelectrolytes
(plasma-graft pore-filling electrolyte membranes using **porous** poly(**tetrafluoroethylene) substrate**)

IT 66796-30-3, Nafion 117
RL: PRP (Properties)
(comparison **membrane**; plasma-graft pore-filling **electrolyte** membranes using **porous** poly(**tetrafluoroethylene) substrate**)

IT 67-56-1, Methanol, uses
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(fuel; plasma-graft pore-filling electrolyte membranes using **porous** poly(**tetrafluoroethylene) substrate**)

IT 108594-60-1P, Acrylic acid-**tetrafluoroethylene** graft copolymer
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(microporous; plasma-graft **pore**-filling electrolyte membranes using **porous** poly(**tetrafluoroethylene**) **substrate**)

RE.CNT 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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(4) Miyake, N; J Electrochem Soc 2001, V148, PA905 HCAPLUS
(5) Rikukawa, M; Prog Polym Sci 2000, V25, P1463 HCAPLUS
(6) Yamaguchi, T; J Electrochem Soc 2002, V149, P1448
(7) Yamaguchi, T; J Membrane Sci 2001, V194, P217 HCAPLUS
(8) Yamaguchi, T; J Membrane Sci submitted
(9) Yamaguchi, T; J Polym Sci, Polym Chem Ed 1996, V34, P1203 HCAPLUS
(10) Yamaguchi, T; Macromolecules 1991, V24, P5522 HCAPLUS

L70 ANSWER 37 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2002:579845 HCAPLUS
DN 137:386866
ED Entered STN: 05 Aug 2002
TI Present state and novel development of polymer **electrolyte** membranes for direct methanol **fuel cell**
AU Yamaguchi, Takeo
CS Dep. Chem. System Eng., The University of Tokyo, Tokyo, 113-8656, Japan
SO Maku (2002), 27(3), 124-130
CODEN: MAKUD9; ISSN: 0385-1036
PB Nippon Maku Gakkai
DT Journal; General Review
LA Japanese
CC 52-0 (**Electrochemical**, Radiational, and Thermal Energy Technology)
AB A review with refs. To develop a high performance direct methanol **fuel cell**, a novel **electrolyte membrane** is needed. This **electrolyte membrane** should be durable up to 130°C to improve the catalytic **reaction**, and the **methanol** crossover should be reduced. Reported membranes are reviewed in this article, and our own approach is shown. Our approach is to design a **pore-filling** type polyelectrolyte **membrane**, where the polyelectrolyte is **filled** into the **pores** of a **porous substrate**, and the **membrane** swelling is suppressed by the substrate matrix. **Proton conductivity** was achieved through the filling **electrolyte** polymer. **Methanol permeation** was controlled by the swelling of the **electrolyte** polymer, and the mech. strength at high temperature was maintained by the substrate. From this concept, a high **proton conductivity** was shown to exist with reduced **membrane** methanol permeability, and in addition, a heat-resistance was also achieved.
ST review **fuel cell** membranes polymer **electrolyte**
IT **Fuel cell** separators
Polymer **electrolytes**
(present state and novel development of polymer **electrolyte** membranes for direct methanol **fuel cell**)

L70 ANSWER 38 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2001-491684 [54] WPIX
DNN N2001-363880 DNC C2001-147772
TI Diaphragm for solid polymer electrolyte type fuel cell, consists of a cation exchange **membrane** having preset permeability coefficient of hydrogen gas and electrical resistance.

DC A17 A85 L03 X12 X16
PA (TOKU) TOKUYAMA CORP
CYC 1
PI JP 2001135328 A 20010518 (200154)* 8 H01M008-02 <--
ADT JP 2001135328 A JP 1999-311129 19991101
PRAI JP 1999-311129 19991101
IC ICM **H01M008-02**
ICS C08J005-22; C08J009-36; H01B001-06; H01B001-12; **H01M008-10**
ICI C08L023:00
AB JP2001135328 A UPAB: 20010924
NOVELTY - A diaphragm consists of cation exchange **membrane** which has a polyolefin type **porous** film **base** material **filled** with a cation exchange resin in the porosity part. The cation exchange **membrane** has permeability coefficient of hydrogen gas of less than 3.0 multiply 10-8 cm3 (STP) cm.cm-2.seconds-1.cm.Hg-1 at 50 deg. C and electrical resistance of less than 0.20 Omega .cm2 in 1 mol/l sulfuric acid aqueous solution.

USE - For solid polymer electrolyte type fuel cell.

ADVANTAGE - The solid high molecular fuel cell diaphragm has sufficient physical strength, low gas permeability and low electrical resistance.

Dwg.0/1
FS CPI EPI
FA AB
MC CPI: A99-A; L03-E04
EPI: X12-D01C; X16-C01

L70 ANSWER 39 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2001:638121 HCAPLUS
ED Entered STN: 02 Sep 2001
TI Porous oxide **electrolyte** membranes for **fuel cells**
AU Tejedor-Tejedor, M. Isabel; Anderson, Marc A.
CS Environmental Chemistry and Technology Program, University of Wisconsin, Madison, WI, 53706, USA
SO Abstracts of Papers, 222nd ACS National Meeting, Chicago, IL, United States, August 26-30, 2001 (2001), COLL-085 Publisher: American Chemical Society, Washington, D. C.
CODEN: 69BUZP
DT Conference; Meeting Abstract
LA English
AB Background: We fabricate microporous oxide membranes as alternatives to organic polymeric **electrolytes** in PEM **fuel cells**. These materials should operate at much higher temps. (>150 °C) than organic polymers while still retaining water, which helps resolve problems with water management and carbon monoxide poisoning. These membranes are cast as thin films directly on and then fired to the cathode and anode. This intimate contact may alleviate charge transfer limitations at the electrode/**membrane** interface. For future scale-up, **membrane** electrode assemblies that incorporate microporous inorg. membranes should be easily fabricated using tape or gel-casting techniques, making this process com. viable. Our previous research has shown that crack-free **inorg.** membranes can be deposited on **porous** nickel supports. **Proton conductivities** of these materials as measured across a micro-porous monolith can reach 5x10-2 S/cm at 25 °C and 81% relative humidity, corresponding to a specific resistivity of 2x10-3 Ω-cm2. Currently, these membranes are being incorporated in test cells for further evaluation at Los Alamos. To date, we have measured **proton conductivities** of TiO2 materials at temps. to

15-40 °C and humidities from 33-90%. Gas permeabilities of TiO_2 membranes on supports have also been measured. Preliminary conductivity data on SiO_2 and Al_2O_3 are favorable, but we have yet to test mixed oxides. Energies of activation for **conducting protons** through TiO_2 depend on the number of water mols./nm2. Two operating regimes and mechanisms are apparent: 1.) Ea decreases with increasing water content and 2.) Ea increases with increasing water coverage. The abrupt change in mechanism at the min. occurs when the **pores fill** with water. Ea also depends on the surface chemical of the pore wall (i.e., degree of protonation and type of surface bound species). Therefore, surface chemical and pore morphol. (size and shape) should greatly affect **proton conductivity** in TiO_2 membranes.

L70 ANSWER 40 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN DUPLICATE 2
AN 2000:646292 HCAPLUS
DN 133:225582
ED Entered STN: 15 Sep 2000
TI **Electrolyte** membranes for **fuel cells**, their manufacture, **fuel cells**, and manufacture of the **fuel cells**
IN Yamaguchi, Takeo; Nakao, Shinichi
PA Center for Advanced Science and Technology Incubation, Ltd., Japan
SO PCT Int. Appl., 20 pp.
CODEN: PIXXD2
DT Patent
LA Japanese
IC ICM H01M008-02
ICS H01M008-10
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000054351	A1	20000914	WO 2000-JP1370	20000307
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	AU 2000028310	A5	20000928	AU 2000-28310	20000307
	EP 1202365	A1	20020502	EP 2000-906746	20000307
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				
PRAI	JP 1999-60817	A	19990308		
	WO 2000-JP1370	W	20000307		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2000054351	ICM	H01M008-02
	ICS	H01M008-10
WO 2000054351	ECLA	H01M008/02E2; H01M008/10B2; H01M008/10C; H01M008/10E; H01M008/10E2
EP 1202365	ECLA	H01M008/02E2; H01M008/10B2; H01M008/10C; H01M008/10E; H01M008/10E2

AB The **electrolyte** membranes have a **proton conductive** polymer **filled** in the **pores** fo a

porous substrate not **swellable** by **MeOH** or **H2O.** The substrate is an inorg. material or a heat resistant polymer. The membranes are prepared by irradiating the **porous substrate** with an energy beam and contacting the substrate with a monomer to form the polymer. The **fuel cells** have the **electrolyte membrane** formed on the catalyst layers of their cathodes or anodes, and are prepared by applying sol on an electrode, converting the sol layer to a **porous substrate** film, **filling** the **pores** in the film with the **proton conductive** polymer, and laminating with the other electrode.

ST **fuel cell proton conductive** polymer **electrolyte**; polymer **electrolyte** **porous substrate fuel cell**

IT Plasma
(argon plasma in manufacture of polymer **electrolyte** membranes containing heat resistant **porous substrates** for **fuel cells**)

IT **Fuel cell electrolytes**
(manufacture of polymer **electrolyte** membranes containing heat resistant **porous substrates** for **fuel cells**)

IT Fluoropolymers, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of polymer **electrolyte** membranes containing heat resistant **porous substrates** for **fuel cells**)

IT 9002-84-0, Teflon 9003-01-4, Polyacrylic acid
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(manufacture of polymer **electrolyte** membranes containing heat resistant **porous substrates** for **fuel cells**)

IT 7440-37-1, Argon, uses
RL: NUU (Other use, unclassified); USES (Uses)
(manufacture of polymer **electrolyte** membranes containing heat resistant **porous substrates** for **fuel cells**)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
(1) Asahi Glass Co Ltd; JP 11135137 A 1999 HCAPLUS
(2) Mitsubishi Heavy Industries Ltd; JP 03208260 A 1991 HCAPLUS
(3) Toa Nenryo Kogyo K K; JP 64022932 A 1989
(4) Tonen Chem Corp; JP 03098632 A 1991 HCAPLUS
(5) Tonen Corporation; JP 07065624 A 1995 HCAPLUS

L70 ANSWER 41 OF 42 WPIX COPYRIGHT 2005 THE THOMSON CORP on STN
AN 2001-007037 [01] WPIX
DNN N2001-005058 DNC C2001-001710
TI Fabrication of composite **membrane** comprises combining first and second polymer components and converting the first polymer to ion-conducting polymer.
DC A85 L03 X16
IN CISAR, A J
PA (LYNN-N) LYNNTECH INC
CYC 80
PI WO 2000063995 A1 20001026 (200101)* EN 29 H01M008-10 <--
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL OA PT SD SE SL SZ UG ZW
W: AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB GE

GH GM HU ID IL IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MD MG MK
MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT UA UG UZ
VN YU ZW
AU 9935706 A 20001102 (200107) H01M008-10 <--
EP 1090436 A1 20010411 (200121) EN H01M008-10 <--
R: DE ES FR GB IT SE

ADT WO 2000063995 A1 WO 1999-US8627 19990420; AU 9935706 A AU 1999-35706 19990420, WO 1999-US8627 19990420; EP 1090436 A1 EP 1999-917633 19990420, WO 1999-US8627 19990420

FDT AU 9935706 A Based on WO 2000063995; EP 1090436 A1 Based on WO 2000063995

PRAI WO 1999-US8627 19990420

IC ICM **H01M008-10**
ICS B01D069-12; C08J005-22

AB WO 200063995 A UPAB: 20001230
NOVELTY - Fabrication of a composite **membrane** comprises combining a first polymer component with a second polymer component, and converting the first component to an ion-conducting precursor. The first component is a non ion-conducting precursor.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a method of making a composite **membrane** comprising initiating a living chain co-polymerization of first and second monomers; and propagating the polymerization to form a co-polymer chain having non-derivatizable monomer region(s) and precursor monomer region(s). The first monomer is a non-derivatizable monomer and the second monomer is a non ion-conducting precursor.

USE - For fabricating a composite **membrane** useful in electrochemical devices requiring a proton conductor, e.g. proton exchange **membranes** (PEM) fuel cells.

ADVANTAGE - The invention allows greater flexibity in controlling or adjusting the physical properties of the **membranes**, e.g. mechanical strength, shape stability, resistance to oxidation, durability and ionic conductivity.

Dwg.0/4

FS CPI EPI

FA AB

MC CPI: A04-E10; A07-A02B; A07-A04; A10-E01; A12-W11A; L03-E04
EPI: X16-C01

L70 ANSWER 42 OF 42 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1986:443904 HCAPLUS

DN 105:43904

ED Entered STN: 09 Aug 1986

TI Distribution of **pores** in graft polyethylene-**based** membranes

AU Tikhomirova, I. Yu.; Snegirev, N. N.; Vybornov, O. Yu.; Damaskin, I. V.; Dovbysh, N. G.

CS Vses. Akkumulyatornyi Inst., Leningrad, USSR

SO Zhurnal Prikladnoi Khimii (Sankt-Peterburg, Russian Federation) (1986), 59(5), 1142-4
CODEN: ZPKHAB; ISSN: 0044-4618

DT Journal

LA Russian

CC 37-5 (Plastics Manufacture and Processing)
Section cross-reference(s): 38, **52**, 66

AB Hg porosimetry was used to study the pore size distribution in acrylic acid-ethylene graft copolymer (I) [9010-77-9] membranes for separators in primary batteries. Three types of pores with sizes 25-32, 75-95, and 2200-3200 Å were present in I separators. The number of large pores decreased and that of small pores increased with increasing elec. resistance of the separator. The amount of medium pores was higher than